Mining CONGRESS JOURNAL

AUGUST 1950

Featuring Metal Mining Convention and Exposition

----------*YOU are Invited to Visit*

the LINK-BELT Exhibit *at the*

METAL MINING CONVENTION AND EXPOSITION,

Space 222, Building 8,
Fair Grounds, Salt Lake City,
August 28th to 31st, 1950

On display will be an operating Link-Belt CA (Concentric Action) Vibrating Screen, of the suspended type; an arrangement of belt conveyor idlers including standard, rubber-tread impact and belt training idlers, and steel roll and rubber-tread return idlers; a Link-Belt Herringbone Gear Drive with transparent housing, driven by a Link-Belt Electrofluid Drive.

Other power transmission units from the broad Link-Belt line on display, will include ball and roller bearing pillow blocks and the various chains popular in the metal mining industry.

Link-Belt representatives, each an experienced specialist in his field, will be present to consult with visitors. The entire exhibit has been designed to give you valuable knowledge and expert advice relating to the efficient use of modern Link-Belt power transmission, conveying and processing equipment.

12,025

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Johannesburg. Offices in Principal Cities.

Its Basic Principles Proved by Consistent Performance for Over 40 Years

For over 40 years Whaley Loaders have always been ready and dependable for low cost mining. For over 40 years the basic loading action principle, proved by performance records, has remained unchanged. Yet, constant improvements have kept our loaders ready to meet the ever increasing demand for greater production and lower cost.

Today, more than ever, no coal mine trying to reduce costs by mechanization can afford to overlook the dependable, consistent loading of the "Automat." No other machine can equal its versatility in service.

Its ability, well known by reputation, for staying on the job shift-after-shift, day-in and day-out, loading consistently, has probably sold more operators on the Whaley "Automat" than any other of its advantages. The logical reason for this endurance of the "Automat" is that it is designed simply and built with materials and parts so composed as to avoid costly breakdowns and repairs, holding maintenance to a minimum.

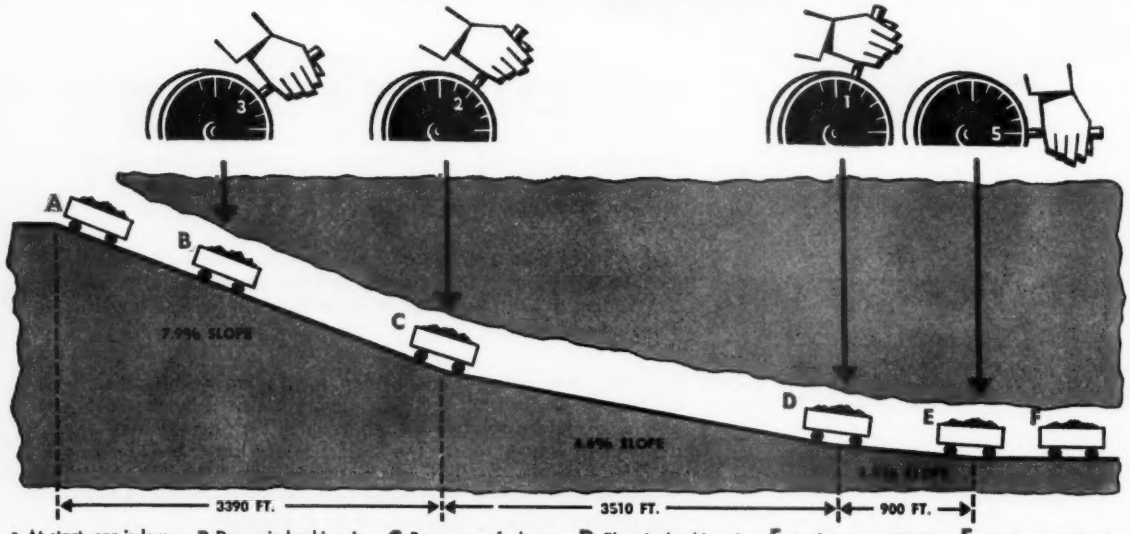
For today's mine operation, check up, by all means, on the consistent, low cost loading of the Whaley "Automat." Write today for our new Catalog 250 giving you the latest and most complete loading machine information ever published. Myers-Whaley Co., Knoxville, Tenn.

MYERS-WHALEY

"MECHANICAL LOADERS EXCLUSIVELY FOR OVER 40 YEARS"

Cut brake wear!
Save spotting time!
Promote safe lowering!

HOW DYNAMIC BRAKING HOLDS THIS UNBALANCED SLOPE HOIST TO APPROXIMATELY 40% FULL SPEED



A At start, car is lowered by gravity and allowed to accelerate to 40% full speed.

B Dynamic braking is then applied in order to prevent speed increase.

C Because of slope change, only approximately 25% braking torque is required to hold speed.

D Electric braking is further decreased to about 13% to correspond with reduced pitch of track.

E At bottom, 100% braking torque is applied to decelerate to low speed for spotting.

F Mechanical brakes are applied only at end of trip to spot and hold cars.

To provide allowable man-trip speed while lowering, 40% of the full rated speed of 1200 fpm is desired over the 7800-foot length of travel. Using dynamic braking to obtain this desired speed, the operator watches his electric rope-speed indicator and simply moves his master switch to the points of braking required. Thus the speed is held in good control.

GENERAL ELECTRIC

General Electric a-c mine-hoist drive in this unbalanced-slope installation uses d-c dynamic braking control to give these advantages in reduced-speed lowering

To increase hauling capacity, the operators of a West-Central Pennsylvania mine recently installed a co-ordinated General Electric a-c mine-hoist drive. Replacing a smaller one, the new drive has boosted payload capacity to 95 tons per trip—330 tons per hour!

But that's not all! Use of d-c dynamic braking to control the hoist motor during reduced-speed lowering also provides these advantages:

Safety promoted! Lowering man-and-material trips are made at safe, uniform speeds, without jerking.

Maintenance costs cut! Mechanical brakes are used only to hold trip at its destination and for final stopping after retarding to low speed with dynamic braking—thus lessening strain and wear on brake wheels and linings.

Spotting time reduced! Control of low-speed lowering permits spotting, landing, and dropping trips into partings with minimum delay.

Economy! Simplicity! Reliability!

G-E induction-motor mine-hoist drives combine the advantages of low first cost and upkeep, simple installation and operation, high efficiency, and rugged reliability. That's why over 800 are now in service, helping to step up mine production and cut hoisting costs.

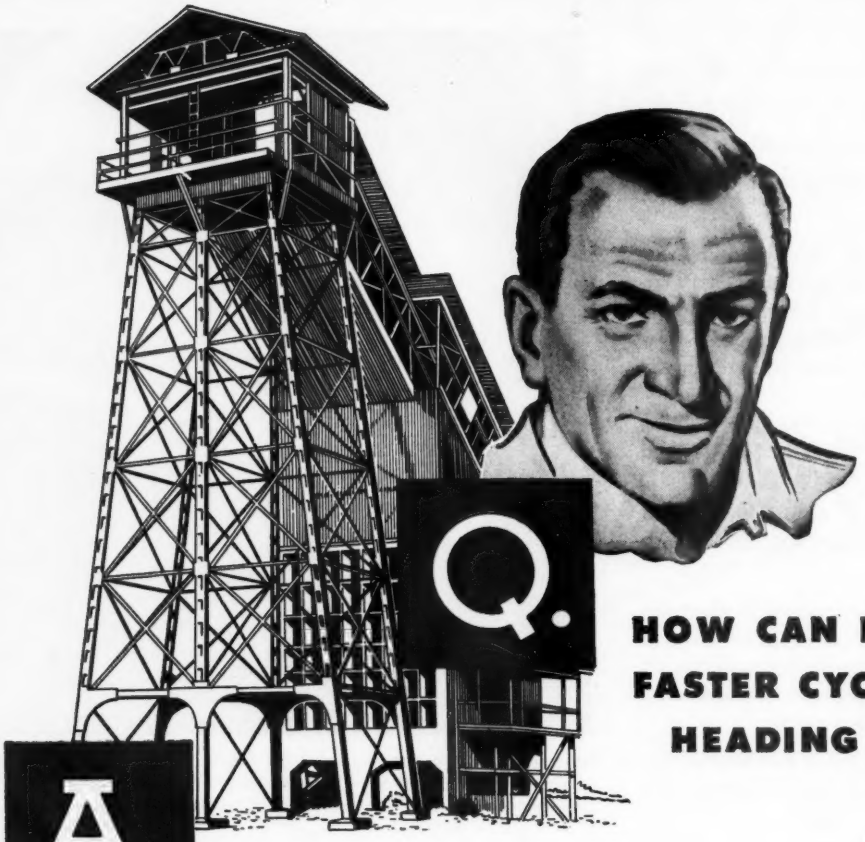
For experienced help on mine-hoist drives and other electric equipment to cut mining costs, it will pay you to call in a G-E mining specialist. Phone him at your nearest G-E office. *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*

Mine-Hoist Drives

...to cut mining costs!

Typical of hundreds of others is the G-E 800-hp wound-rotor induction motor geared to the hoist at this mine. In ratings from 50 to 3500 hp, these motors offer the simplest way to obtain the advantages of electric drive for mine hoists.

G-E control and protective equipment, located in the hoist house conveniently near motor and drum, provides full magnetic reversing d-c dynamic braking control of the hoist motor and protection of machines and power system.



Q. HOW CAN I GET A FASTER CYCLE IN EVERY HEADING?

A. Let Gardner-Denver GD14 Mine Car Loaders handle the mucking. That's one good way to speed up the drilling-blasting-loading cycle in every heading. With these fast, clean-mucking loaders, you can schedule the work to keep every loader busy throughout every shift. You'll find that productivity and efficiency are increased — mining costs are lowered.

GD14 Loaders give you full-time availability — as proved by their performance in hundreds of mining installations. Gardner-Denver *master engineering* features provide speed for the job and safety for the man. Get all the facts — send today for Bulletin MCL.

Two powerful 5-cylinder radial air motors function in the GD14 crowding action to assure a full dipper every time.

SINCE 1859

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Contents

VOLUME 36, NUMBER 8 FOR AUGUST, 1950

PAGE

FRONT COVER: Drilling Out a Round at the Bingham Canyon Open Pit of the Utah Copper Division, Kennecott Copper Corp.

EDITORIALS 33

NORTHERN IRON ORE MEETS STRATEGIC NEEDS—PART I 34
By JOHN E. KELLY

SALT LAKE CITY WELCOMES MINERS 38
Official Program 46-47
Exposition Preview 53

NEUTRALIZING ACID MINE WATER 62
By HENRY F. HEBLEY

SALT IN KANSAS 65
By EARL K. NIXON

WHEEL EXCAVATOR FOR OVERBURDEN REMOVAL 70
By J. J. HUEY

HOW TO GET MORE FOOTAGE OUT OF HOLLOW DRILL STEEL 74
By C. W. DARBY and R. M. SIMPSON

MECHANICAL LABOR SAVING DEVICES FOR THE ASSAY OFFICE 80
By L. A. CREGLOW

ROTARY RIGS DRILL BLAST HOLES 82
By R. E. KINTER

WHEELS OF GOVERNMENT 85

PERSONALS 89

NEWS AND VIEWS 95

MANUFACTURERS FORUM 110

Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress

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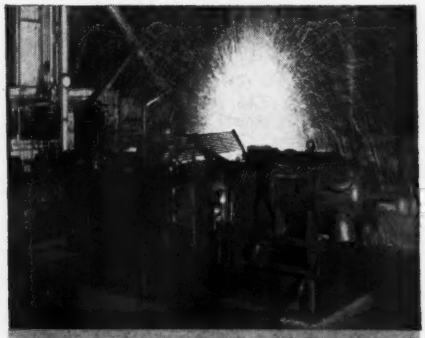
ABC
Member Audit Bureau of Circulations

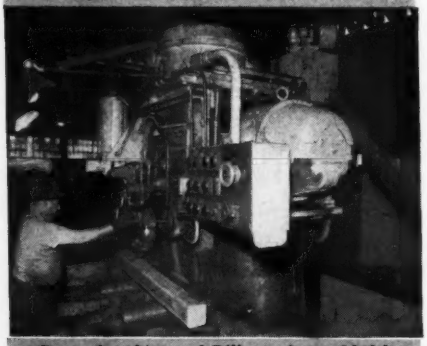
For the toughest jobs in your plant . . . choose

THE TOUGHEST MOTORS EVER BUILT!



Reliance Type 'T' Splash-proof D-c. Motors provide dependable power for shelp levellers in modern tube mills.

On continuous miners, specially designed Reliance Type 'T' D-c. Motors provide greater horsepower in the limited space available than ever before attained.



Power for chipper of Billeteer is provided by motor which is subject to recurring shock overloads. Protection and capacity, without excess weight, are obtained by use of force-ventilated Reliance Type 'T' D-c. Motor.

RELIANCE *TYPE 'T'* HEAVY DUTY D-C. MOTORS

Wherever motors must meet rugged service requirements, Reliance Type 'T' Heavy Duty D-c. Motors are right in their element! Designed, engineered and constantly improved to satisfy the requirements specified by users, these dependable motors have proved their amazing endurance in steel mills, in underground mines and in countless other industrial applications.

All-steel frames give maximum strength. Other features: thorough insulation of armatures and field coils by Reli-X varnish treatment; extra-strong commutators to assure capacity for overloads of current and speed; cast bronze brush holders to provide and maintain accuracy for peak performance; precision bearing design . . . "you can't grease 'em wrong". Write today for *new* Bulletin C-2001 containing complete data on these rugged, heavy duty Type 'T' D-c. Motors available from 3/4 to 1000 horsepower for constant or adjustable speed.

Sales Representatives in Principal Cities

RELIANCE ELECTRIC AND ENGINEERING CO.

"Motor-Drive is More Than Power" • 1116 Ivanhoe Road, Cleveland 10, Ohio

Stops throw-off on dipperstick gears!

LUBRICANT throw-off from dipperstick gears on the shovel shown above brought trouble and expense to the Landrey Mining Company of Winslow, Indiana. The gears had to be greased once or twice each shift. This took time and labor, consumed lubricant by the pound.

A Standard Oil lubrication specialist persuaded company officials to try one of the Calumet Viscous Lubricants—No. 10X.

The results are reported by Ralph A. Landrey, president of the company. "After the first application, no additional lubrication was needed after one full week of operation. However, we added some lubricant because it seemed impossible that there could be any left on the gears. At the present time, we add Calumet Viscous Lubricant No. 10X about every three weeks. *We have not only extended gear life but have made a considerable saving in the amount of lubricant and in the labor required for application.*"

Savings such as these have been brought to a host of midwest mines by Standard Oil's lubrication engineering service and high-quality products. How these service and product advantages can help you is explained at the right.

CALUMET VISCOUS LUBRICANTS

What's YOUR problem?

Oscar Daussman, lubrication specialist at Standard Oil's Evansville, Indiana, office solved the Landrey Mining Company's problem because he was thoroughly familiar both with the qualifications of his products and with the requirements of the job. He applied the lubricant that exactly met the customer's needs.

There is a corps of such lubrication specialists throughout the Midwest who are trained and experienced to help mine and plant operators solve similar problems. Experience enables these men to find quickly the cause of lubricating trouble. Knowledge of petroleum products enables them to prescribe the lubricant needed. There is one of these lubrication specialists at the Standard Oil Company (Indiana) office near you. He is there to serve you. A call or card will put him at your service.

Investigate the cost-cutting possibilities of these lubricants

STANOIL INDUSTRIAL OILS

Here's one line of oils that provides cleaner operation of loader and crane hydraulic units, supplies effective lubrication in compressors, gear cases, and circulating systems. One or two grades can replace a wide variety of special oils and lubricants.

SUPERLA MINE LUBRICANTS

This new, improved line of oils and greases provides better lubrication of cutters, loaders, locomotives, mine cars, and other underground equipment. They eliminate transmission-case deposits, reduce clutch-plate gumming, and minimize wear on gears and bearings.

CALUMET VISCOUS LUBRICANTS

On open gears and wire rope, these greases strongly resist washing and throw-off. Their superior wetting ability affords better coating of gears and better internal lubrication of wire rope.

STANDARD OIL COMPANY (INDIANA) STANDARD

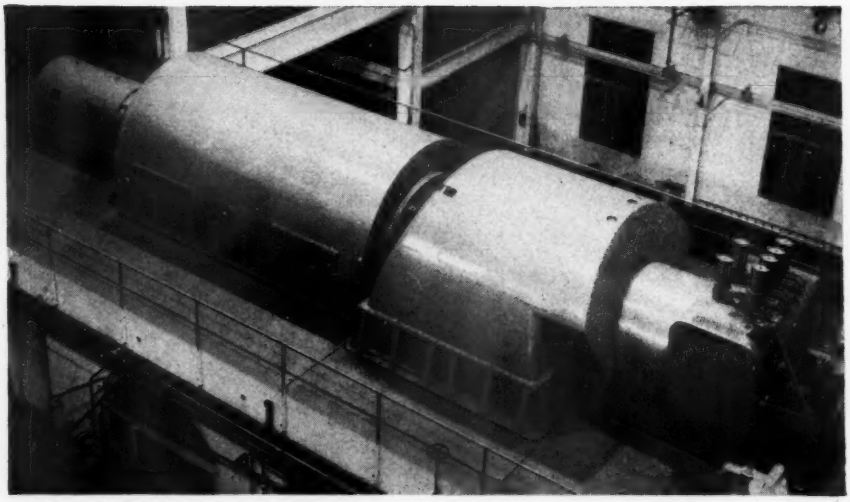
THE JEFFREY MANUFACTURING COMPANY

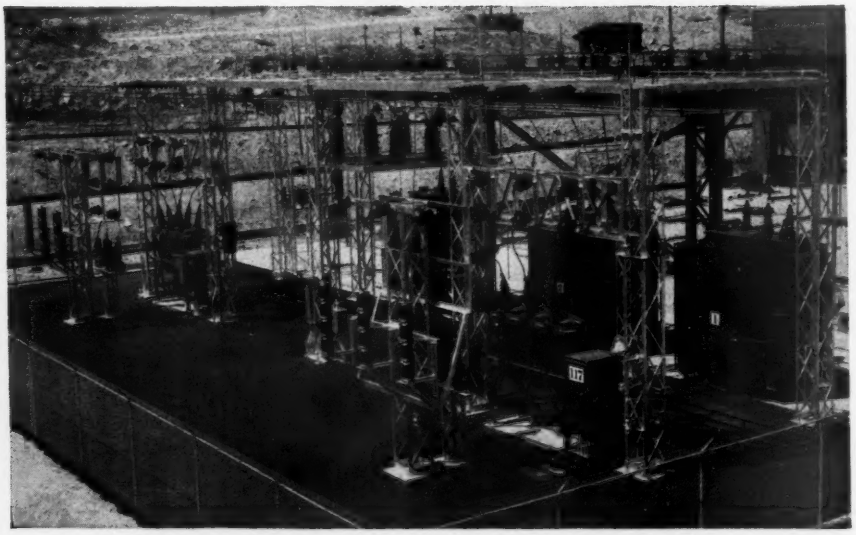
958 North Fourth Street, Columbus 16, Ohio

CUTTERS • DRILLS • CONVEYORS • LOADERS • SHUTTLE CARS • LOCOMOTIVES • JIGS • FANS

Powered for low-cost high-tonnage refining!

1 Typical of the mining industry's increasing electrification to handle high tonnages at low cost is this new copper refinery at Garfield, Utah, which has a capacity of 12,000 tons of refined copper per month, with provision for expansion to 16,000 tons. Power for the refinery and other operations comes from Kennecott's power station, where three G-E steam turbine-generators (two of 25,000 kw each, plus the 50,000-kw unit shown here) generate 13.8-kv power which is stepped up to 44 kv for transmission.



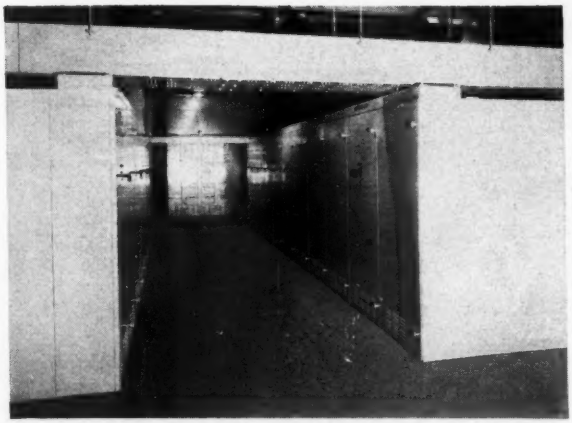


2 At the refinery, three miles away from the power plant, incoming 44-kv power is stepped down to 13.8 kv at this G-E package substation. Completely co-ordinated, it includes an outdoor steel switching structure, three 7500/9375-kva power transformers (with provision for addition of a fourth) and necessary metal-clad switchgear. G-E package substations, made in many standard combinations to fit all mining-industry needs, come in factory-built sections ready to install. They simplify ordering, save engineering time, speed installation, cut costs.

GENERAL ELECTRIC

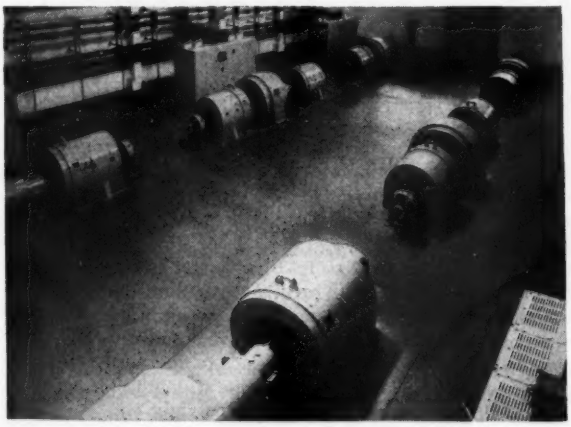
660-20

In its new electrolytic refinery, Kennecott Copper Corporation uses this General Electric generation, conversion, and distribution equipment to help maintain production continuity



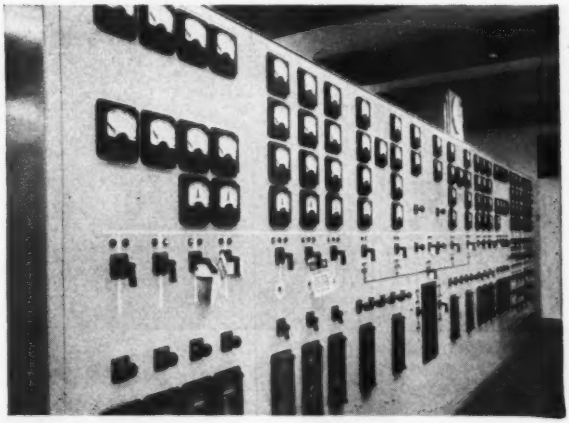
3 Inside the refinery, protecting all 13.8-kv feeders and personnel as well, is this G-E metal-clad switchgear that provides flexibility for future load changes.

4 A-c is converted to d-c for electrolytic cell lines by six G-E motor-generator sets, each including a 2900-hp synchronous motor and two 1000-kw, 125-volt d-c generators.



5 Four G-E 1500-kva double ended load-center substations (one shown) step down voltage from 13,800 to 480 and provide distribution at centers of load to reduce power losses.

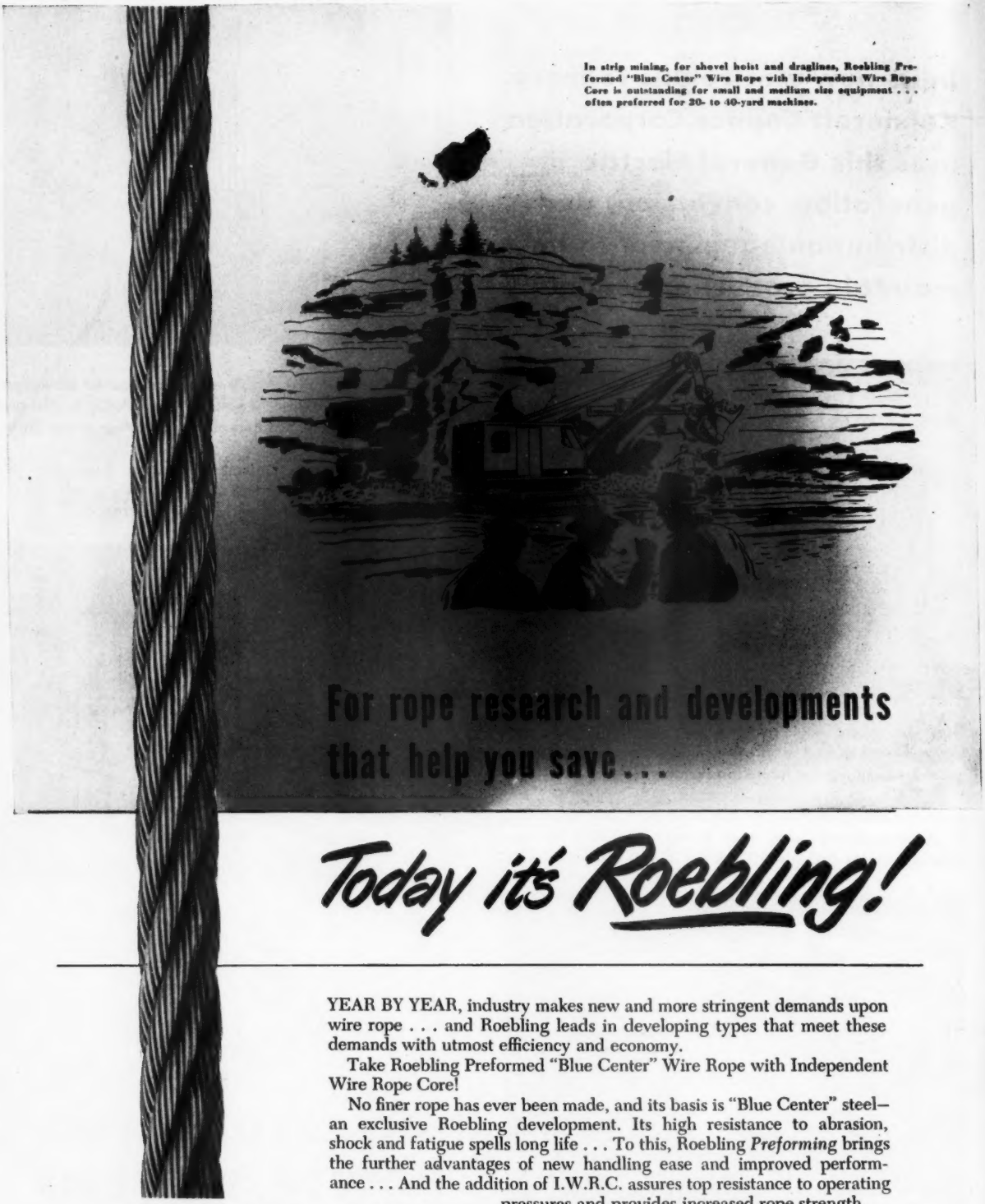
6 This G-E panel — controlling package substation, a-c switchgear, and d-c power for electrolytic cell lines — helps centralize and co-ordinate plant operations.



CO-ORDINATED POWER SYSTEMS

for the Mining Industry

Whatever your mining or processing problem, a good man to know is the mining industry specialist in your nearby G-E office. Ask him about power-system equipment for *your* plant to protect service continuity, help boost production, cut costs. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*


In strip mining, for shovel hoist and draglines, Roebling Preformed "Blue Center" Wire Rope with Independent Wire Rope Core is outstanding for small and medium size equipment . . . often preferred for 20- to 40-yard machines.
For rope research and developments that help you save . . .

Today it's Roebling!

YEAR BY YEAR, industry makes new and more stringent demands upon wire rope . . . and Roebling leads in developing types that meet these demands with utmost efficiency and economy.

Take Roebling Preformed "Blue Center" Wire Rope with Independent Wire Rope Core!

No finer rope has ever been made, and its basis is "Blue Center" steel—an exclusive Roebling development. Its high resistance to abrasion, shock and fatigue spells long life . . . To this, Roebling *Preforming* brings the further advantages of new handling ease and improved performance . . . And the addition of I.W.R.C. assures top resistance to operating pressures and provides increased rope strength.

Roebling makes a wire rope of the right construction, grade and size for every type and make of rope-rigged equipment. Have your Roebling Field Man recommend the best rope for low-cost performance on each of your installations.

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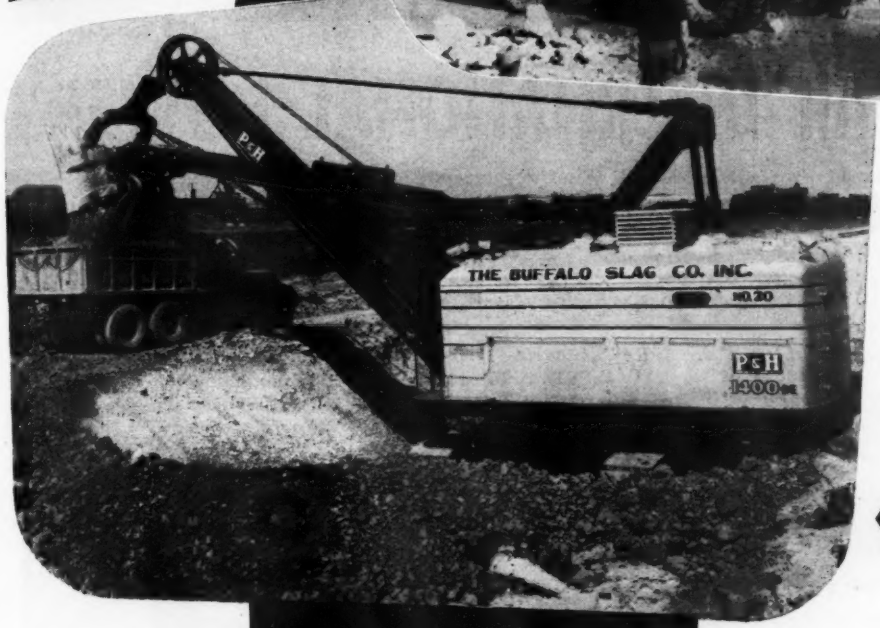
For Rock Bottom Costs From Start to Finish!



START . . . FLUXING STONE
A P&H Model 1400 Diesel-Electric (4 yd.) shovel, owned by Drummond Dolomite Inc. at Drummond Island, Michigan.

FINISH . . . BLAST FURNACE SLAG
A P&H Model 1400 Diesel-Electric shovel owned by the Buffalo Slag Co., Buffalo, New York.

P&H DIESEL-ELECTRIC SHOVELS

with *MAGNETORQUE** HOIST DRIVE

Now, you can have electric shovel efficiency *anywhere* with a P&H Diesel-Electric quarry and mining shovel. It's a complete electric shovel . . . with the addition of a diesel engine to furnish power . . . entirely independent of high line service.

Years of the toughest rock digging have proved the P&H Diesel-Electric from every standpoint . . . dependable operation . . . less maintenance . . . rock bottom tonnage costs.

This simplified P&H Diesel-Electric shovel is made possible by the exclusive P&H Magnetorque Hoist Drive. Hoist generator, hoist motor, slip friction clutch and other mechanical devices are completely eliminated. Magnetorque is only one of many P&H Added Values. Ask for Bulletin X83-DE.

Every Third P&H Electric Shovel Sold is a Repeat Order.

P&H **ELECTRIC SHOVELS**
4555 West National Avenue
Milwaukee 14, Wis.

HARNISCHFEGER CORPORATION

*Trade-Mark of Harnischfeger Corporation for electro-magnetic type clutch

POWER ON TRACKS

Big "Champions of Crawlers," mighty International TD-24's strip overburden for Snyder Bros.

"We Use All INTERNATIONAL POWER"

—says C. H. Snyder of Snyder Bros., Inc., Cowansville, Pa., strip miners. The reasons why are clear.

For example, the two International TD-24's working for Snyder Bros., do as much work as a four-yard dragline when it comes to removing overburden. The two big "Champions" are also available when needed to build roads over the steep Pennsylvania mountainsides and do other construction work.

An International UD-24 Diesel Power Unit teamed up with a matched generator set produces all the electric power needed for the mine. This is the same powerful engine that drives the big "Champion of Crawlers" and is as dependable as daybreak.

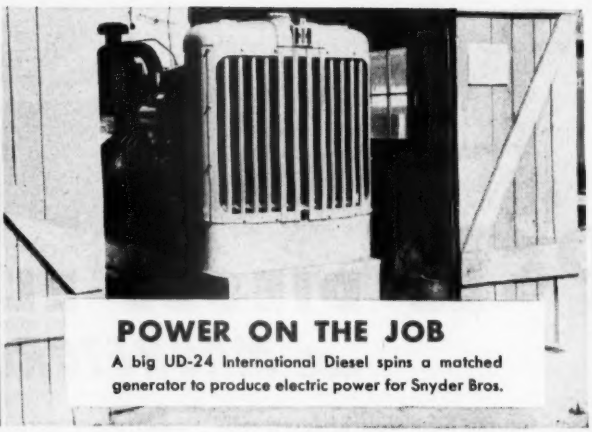
To complete the power picture, an International "A" wheel tractor sweeps the coal to remove dirt before shoveling it into trucks.

"We preach International constantly," says Mr. Snyder. That is the mark of a satisfied owner. Why not visit your International Industrial Power Distributor now and find out the facts? You, too, will find it pays to use International Power.

INTERNATIONAL HARVESTER COMPANY • Chicago

POWER ON WHEELS

A fast, compact International "A" and mounted broom sweep the coal before it is shoveled into trucks.



POWER ON THE JOB

A big UD-24 International Diesel spins a matched generator to produce electric power for Snyder Bros.

Partnership on Power Pays

INTERNATIONAL HARVESTER

INTERNATIONAL INDUSTRIAL POWER

CRAWLER TRACTORS • WHEEL TRACTORS • DIESEL ENGINES • POWER UNITS

GOODMAN
METAL MINE LOCOMOTIVES

A 4-ton, 2 motor trolley locomotive for operation at 500 volts. Gauge is 24", convertible to 30". Swivel trolley pole base permits pole to be swung for use on wire over either rail or in center. All electrical units are protected from water and muck.

A TYPE AND SIZE FOR EVERY PURPOSE

Goodman locomotives in trolley, storage battery and combination types cover the entire range of metal mine service. Let us help you make a selection to suit your conditions.

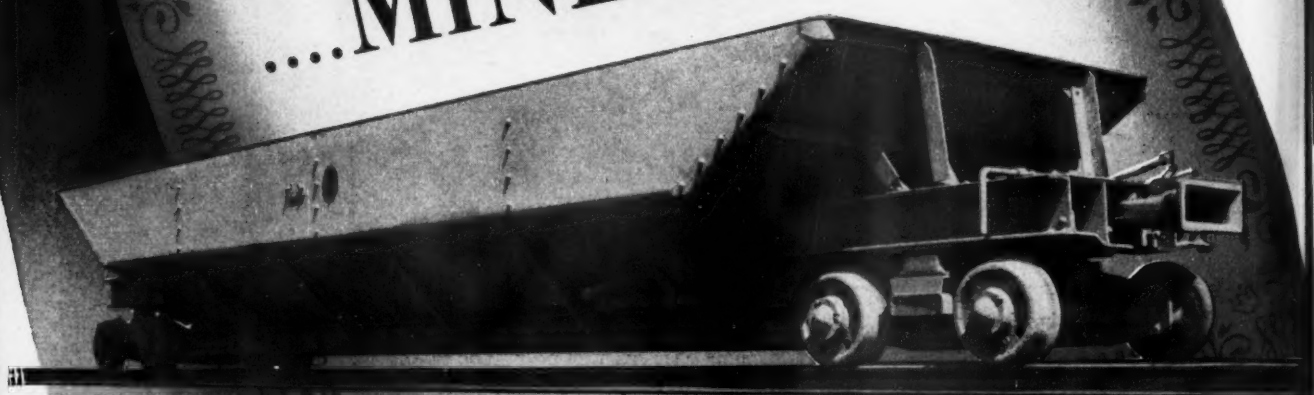
HALSTED ST. AT 48TH **GOODMAN MANUFACTURING COMPANY** CHICAGO 9, ILLINOIS

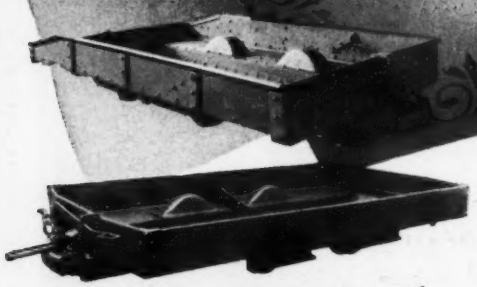
In Great Britain: The Eickhoff Engineering Company, Ltd.

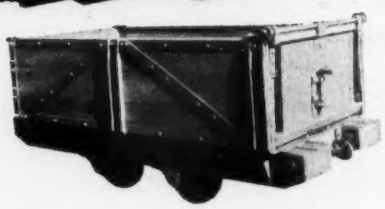
Best Insurance

AGAINST HAULAGE SHUT-DOWNS

....MINE CARS....







In order to maintain maximum coal production your transportation system must function *constantly*.

A few minutes' delay cannot materially affect daily production, but a prolonged shut-down caused by mechanical failure seriously curtails output, with resultant increase in costs per ton of coal mined.

Only mine cars can give you assurance of *constant coal haulage* that's so vital to your daily production.

a.C.f. MINE CARS

for Constant Haulage

Your A.C.F. Sales Representative will be glad to explain the advantages of 'constant coal haulage' with Mine Cars. American Car and Foundry Company New York • Chicago • St. Louis Cleveland • Philadelphia • Washington • Huntington, W. Va. San Francisco • Pittsburgh • Berwick, Pa.

For greater **SPEED...**

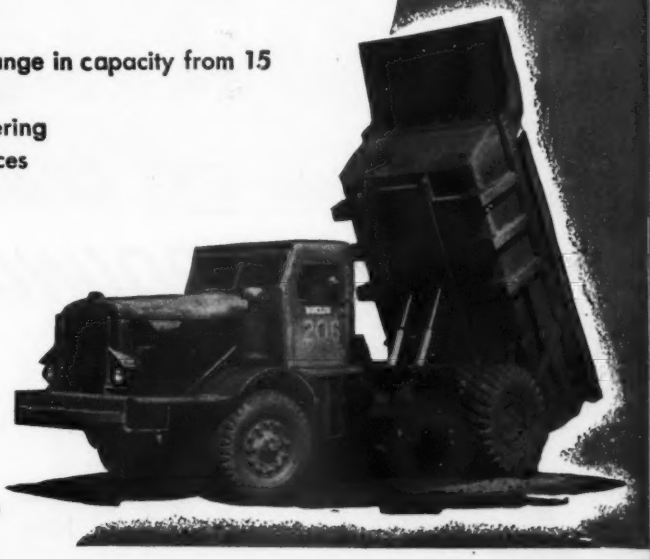
STABILITY...

SMOOTHER RIDING...

SPRING MOUNTED REAR-DUMP EUCLIDS

This new line of spring mounted Rear-Dump Euclids is designed for greater speed and stability on the haul road and long life in off-the-highway service. Heavy leaf springs are free floating in spring brackets to assure smooth riding and prevent breakage caused by twisting action on rough roads. Axles are positioned to the frame by longitudinal radius rods.

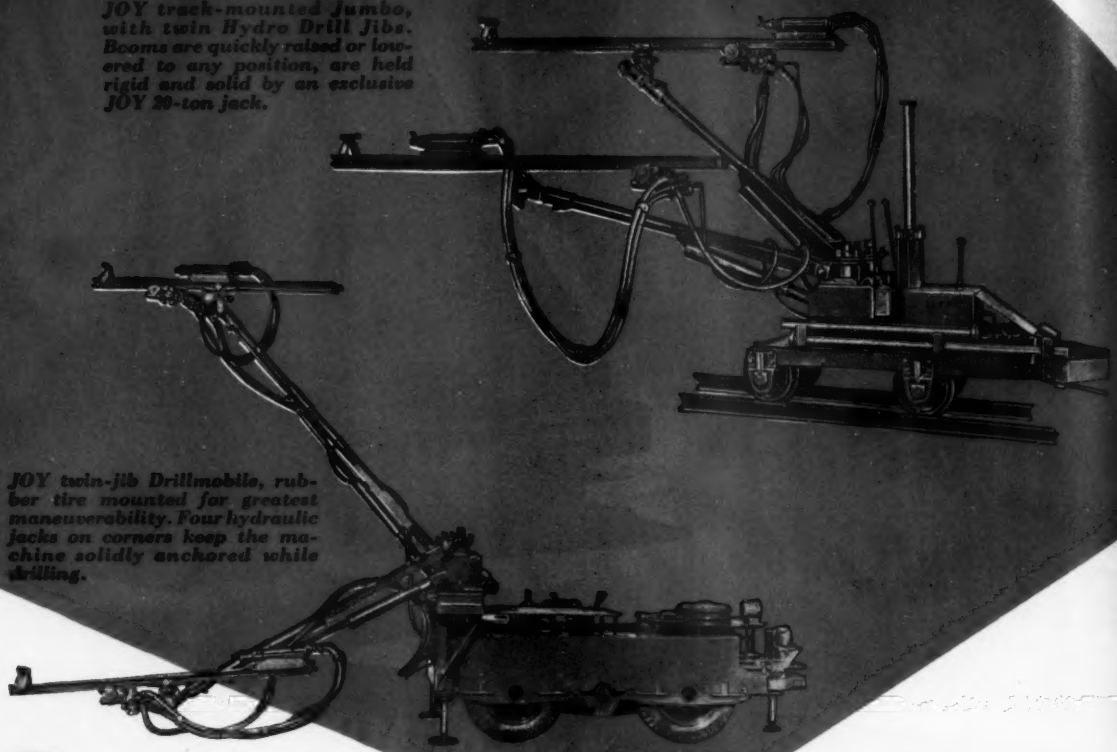
Rear-Dump Euclids with spring mounted drive axles range in capacity from 15 to 34 tons . . . diesel engines to 380 horsepower . . . and have travel speeds up to 32.2 m.p.h. Hydraulic booster steering assures positive control over all road conditions and reduces driver effort on sharp turns and rough hauls.



Built to the same high standards of construction and design that have made "Eucs" the favorite for tough hauling jobs, these improved models provide outstanding performance and lowest cost per ton or yard moved. Your Euclid distributor will be glad to show you how Euclid equipment can help cut your hauling costs and make more profit for you.

The EUCLID ROAD MACHINERY Co.
CLEVELAND 17, OHIO

EUCLIDS



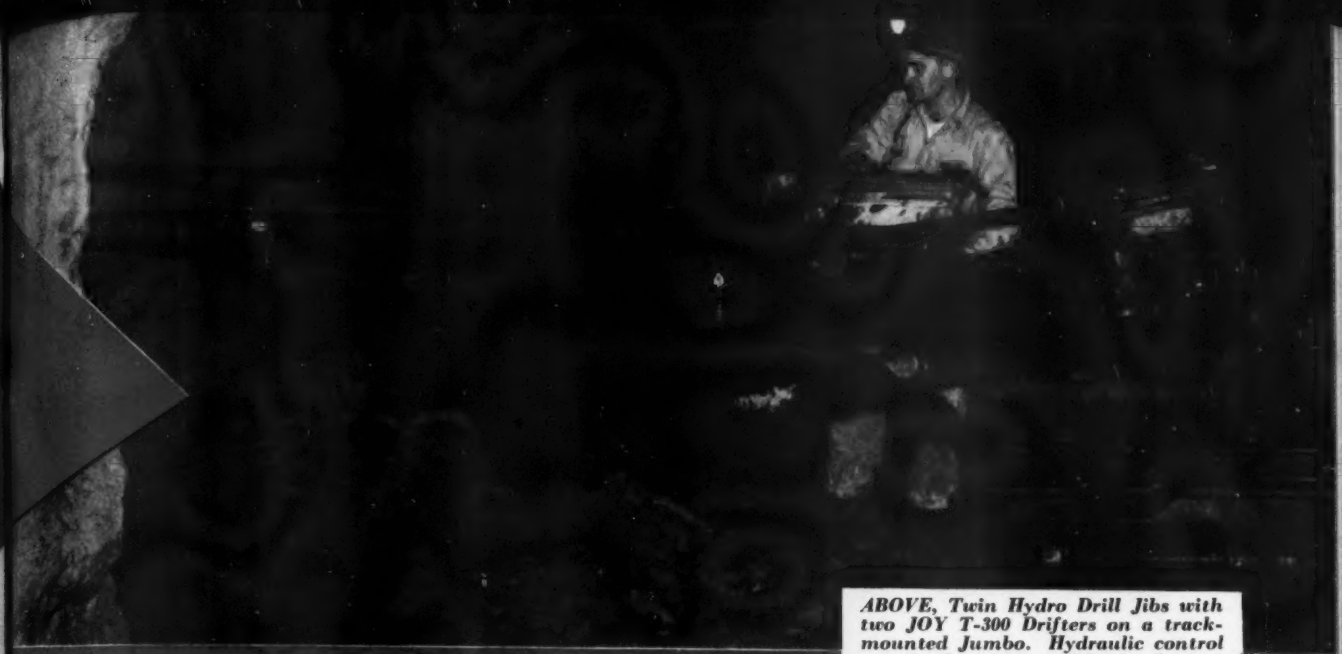
JOY track-mounted Jumbo, with twin Hydro Drill Jibs. Booms are quickly raised or lowered to any position, are held rigid and solid by an exclusive JOY 20-ton jack.

JOY twin-jib Drillmobile, rubber tire mounted for greatest maneuverability. Four hydraulic jacks on corners keep the machine solidly anchored while drilling.

Only JOY HYDRO DRILL JIBS

give you all these Advantages for FASTER ROUNDS at LESS COST

- ★ Long drill feeds—remote control of drills for easy one-man operation
- ★ Complete hydraulic control of jib positioning—pioneered by JOY
- ★ Drill holes more accurately spaced—correct angles more easily maintained
- ★ Greater speed in moving in—setting up—tearing down and moving out . . . no lost time
- ★ Drills holes anywhere in the face—no blind spots
- ★ Greater safety and no back-breaking labor for drill runners —they like it

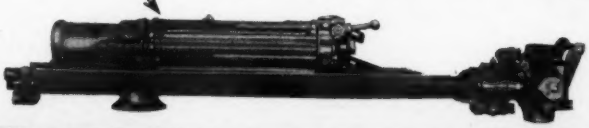


ABOVE, Twin Hydro Drill Jibs with two JOY T-300 Drifters on a track-mounted Jumbo. Hydraulic control permits fast, easy positioning for any drilling angles. BELOW, a single Hydro Drill Jib model. Remote control and long feeds promote safety.

FOR BEST ALL-AROUND PERFORMANCE WITH JOY HYDRO DRILL JIBS . . .

JOY SILVER-STREAK DRIFTERS

and JOY SULMET BITS



Write for Bulletins, or

Consult a Joy Engineer

JOY MANUFACTURING COMPANY

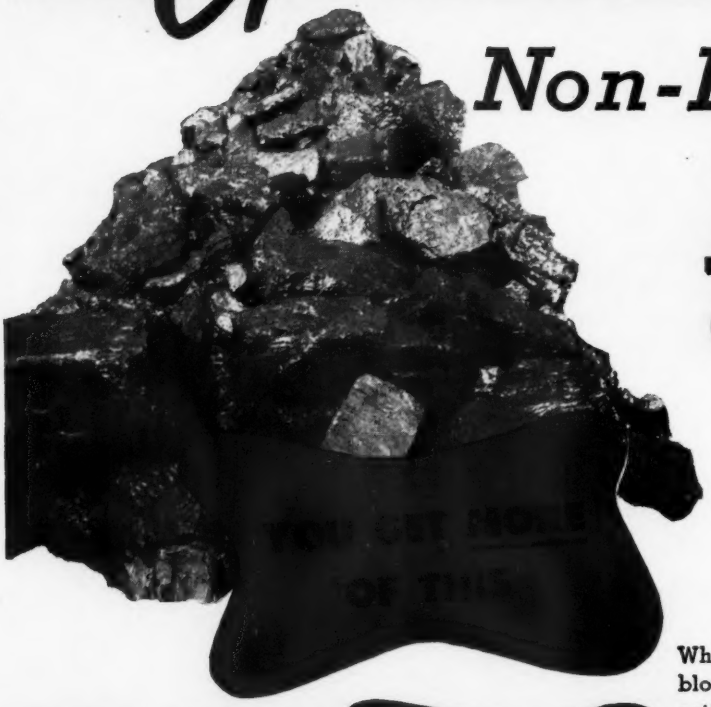
GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

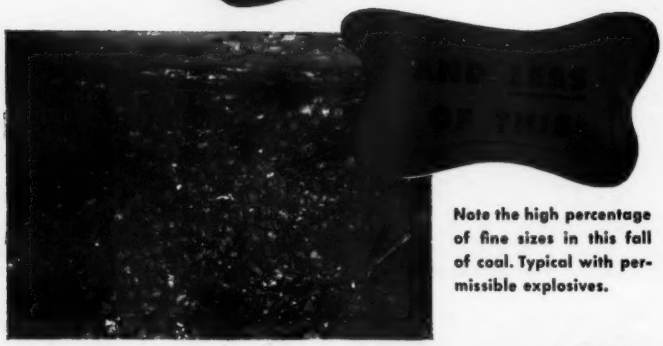
IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

Gently DOES IT

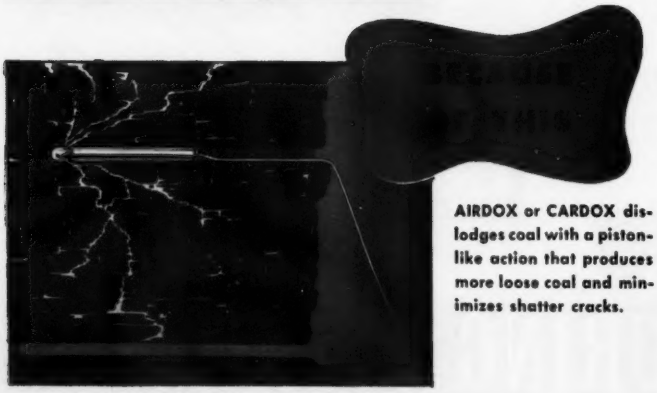
Non-Explosive MINING METHODS

AIRDOX CARDOX





Note the high percentage of fine sizes in this fall of coal. Typical with permissible explosives.



AIRDOX or CARDOX dislodges coal with a piston-like action that produces more loose coal and minimizes shatter cracks.

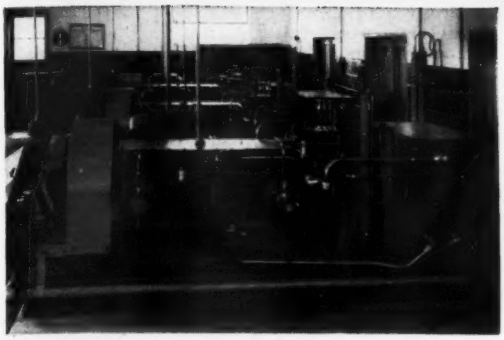
Treat your coal gently— it may be worth more than you know! Let's look at the facts:

When you replace the shattering, hammer-like blows of explosives with the gentle, heaving action of AIRDOX or CARDOX, you get more premium price coal in every ton mined. Specifically, you decrease the minus 2" coal by 10% to 15% and reduce the proportion of minus ¼" coal to an even greater extent. But your increased realization goes far beyond that.

Non-Explosive Mining Methods — AIRDOX or CARDOX — break down the face along natural lines of cleavage. Shatter cracks that cause progressively costly degradation are eliminated. Your coal retains its firm structure all the way from face to furnace — even under extensive mechanical handling, long distance shipment and rough handling in the dealer's yard. *Result: — better coal that's easier to sell.*

Add the factors of greater mine safety, easier loading, easier cleaning — and you can see why the most progressive and efficient mines, in greater numbers than ever before, are changing over to AIRDOX or CARDOX Non-Explosive Mining Methods.

...and pays a reward in GREATER REALIZATION from face to furnace



AIRDOX

AIRDOX at work! Each of these AIRDOX compressors (left) supplies enough high-pressure air to break approximately 750 tons of coal per 8-hour shift.

AIRDOX dislodges coal with compressed air. Its gentle heaving action shears the rib and top clean . . . rolls the coal forward in a loose pile for faster loading . . . reduces hazards of roof failure. It permits on-shift shooting in locations where mine safety laws prohibit use of explosives while men are in the mines. Crews can enter the working face immediately after the fall, enabling greatest possible use of the most modern mechanized equipment.

Equipping a mine to take advantage of the economy and safety features of AIRDOX requires practically no change in operating methods. High pressure air, supplied by one or more electrically driven compressors at the surface, is carried into the working sections of the mine through steel and copper tubing. AIRDOX Tubes are inserted into drill holes in the face. Under the remote control of an operator, they discharge compressed air to break the coal. Force is concentrated at the *back* of the drill hole, where it is most effective. There is no smoke, flame or fumes and very little dust. AIRDOX Tubes may be used over and over again.

Operating control valve which releases compressed air in AIRDOX Tube to dislodge coal.

which for you—AIRDOX or CARDOX?

Each offers you the benefits of greater realization, greater safety and more salable coal. Recommendations as to whether CARDOX or AIRDOX better suits your needs will be made after examination of all factors by one of our engineers. Ask for this free survey today. This may well be your first step toward maximum profits from your mining operations.

CARDOX

BOWDIL PRODUCTS

HELP YOU GET MORE $$$ FROM THAT MINE OF YOURS

NEW TELESCOPING TRANSIT SUPPORT

For use in all types deep mining, especially efficient for conveyor mining. As rigid as a prop, sturdily constructed of aluminum and stainless steel. Lightweight, easily, quickly sets up correct height for transit. Main column graduated on 2 sides in 1/100 foot.
Three standard lengths telescoping from 3 to 5 ft., 5 to 8 ft., and 8 to 12 ft. in height. Special lengths furnished on request.

BOWDIL BITS

Patented concave design increases bit clearance, assures longer wear without increased power consumption. Made from special steel, rolled, with concave faces. Tests in hundreds of mines have proven these Bits last 15% to 20% longer. Bowdil makes the right size and shape bit for every mining condition, to fit all types of chain.

BOWDIL CUTTER BAR

Bowdil Cutter Bars are designed for extra strength and power saving. Rivet-free body, Z bar construction, wide wearing strips make it the sturdiest bar in mining. Bowdil Bars are standardized to fit all coal mining machines.

FABRI-FORGE CHAIN

Lower your operating costs with Bowdil Fabri-Forged Chain. Rugged, easy to maintain, the drop-forged lug body stands up under heavy wear with breakage practically eliminated. A major improvement is the true-running radial track guide.

BOWDIL FAST ROPE SOCKET

You can save time with the Bowdil Rope Socket . . . takes just two minutes to install. No tools necessary. High tensile-strength steel and patented design give maximum strength.

REPLACEABLE POINT MINER'S PICK

With a Bowdil Miner's pick, it only takes a few seconds to replace a dull, blunted point with a sharp one. Light or heavy, Bowdil pick heads are perfectly designed for weight and balance, come with or without wood handle.

ALLOY STEEL AUGERS AND DRILL BITS

Uniform temper and shape eliminate almost all possibility of "grabbing." The use of special heat-treated alloy steels not only makes them last longer, but adds an important safety factor.

BOWDIL DRILL BITS

Any bit requirements can be met from Bowdil's complete line. Fish-tail auger bits, four-point auger bits and two-point clay bits are available in a number of different sizes . . . all made from Bowdil's specially treated steel for long and efficient service.

DETACHABLE JAW SPIKE PULLER

Small, easy to handle . . . pays for itself many times over. Detachable jaws make it possible to replace claws without delay. The special construction pulls spikes without bending them.

SPROCKETS FOR ALL MINING MACHINES

Bowdil Sprockets are made from special heat-treated alloy steel and designed for hard wear. Our stock of over 100 different styles includes clutch, spline and keyed types—various tooth designs of 4 to 13 teeth.

WANT SOMETHING SPECIAL? BOWDIL CAN BUILD IT

Bowdil has the staff and facilities to work with you on any custom building or rebuilding, engineering, machining, fabricating. Excellent heat-treat equipment. If you have a problem, bring it to Bowdil.

BATTERY OPERATED MINE LOCOMOTIVE DESIGNED AND BUILT BY BOWDIL

SALES ENGINEERS IN—Whitesburg, Kentucky—West Frankfort, Illinois Charleroi, Pennsylvania — Denver, Colorado — Big Stone Gap, Virginia Danville, West Virginia — Canton, Ohio — Birmingham, Alabama Helper, Utah—Kansas City, Missouri—Centerville, Iowa—Topeka, Kansas New Castle, England — Alberta, Canada

SALES AGENTS FOR *The Cincinnati* **ELECTRIC DRILL**

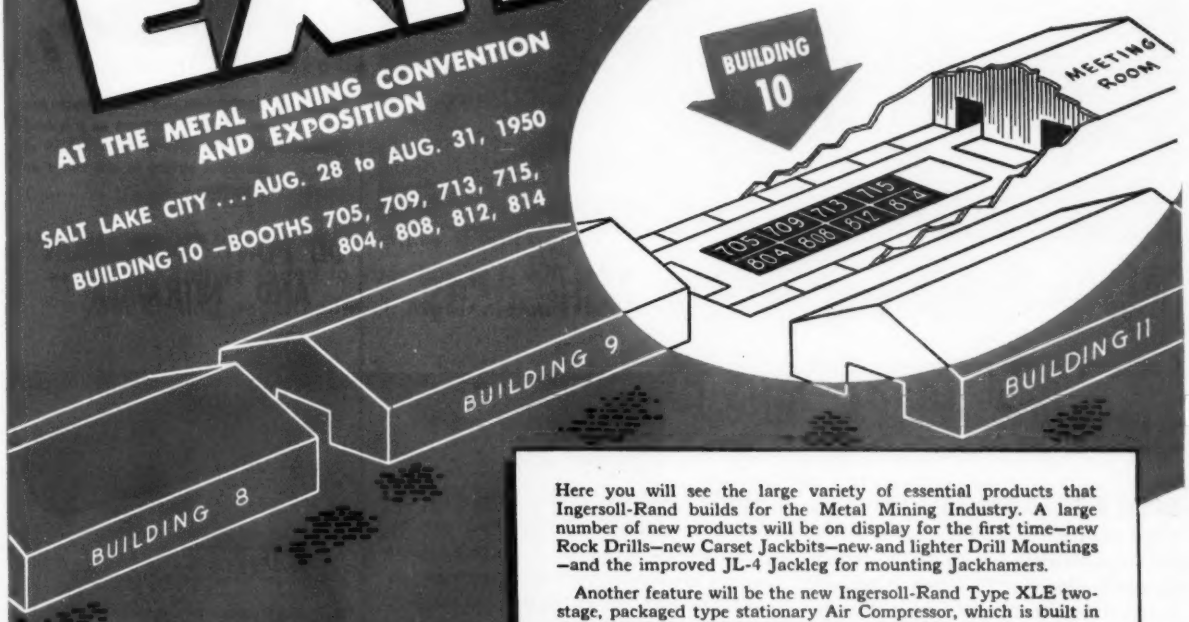
BOWDIL
COAL CUTTING EQUIPMENT
CANTON OHIO

Visit Ingersoll-Rand EXHIBIT

AT THE METAL MINING CONVENTION AND EXPOSITION

SALT LAKE CITY . . . AUG. 28 to AUG. 31, 1950

BUILDING 10 —BOOTHS 705, 709, 713, 715, 804, 808, 812, 814



Here you will see the large variety of essential products that Ingersoll-Rand builds for the Metal Mining Industry. A large number of new products will be on display for the first time—new Rock Drills—new Carset Jackbits—new and lighter Drill Mountings —and the improved JL-4 Jackleg for mounting Jackhamers.

Another feature will be the new Ingersoll-Rand Type XLE two-stage, packaged type stationary Air Compressor, which is built in sizes from 125 to 350 hp for pressures up to 125 psi.

A working exhibit of hoists will be of real interest to those needing portable Air and Electric Hoists for slushing and other operations. And, the portable power tool display includes Electric and Air Impact Tools, Riveters, Chippers, Grinders, Woodborers and Paving Breakers—tools that reduce production costs and make the job faster and easier.

An innovation this year will be an exhibit of a new, large, multi-stage high-pressure Centrifugal Pump, and several smaller pumps for general service and shaft sinking operations.

Ingersoll-Rand engineers will welcome the opportunity of giving you complete details of these and many other I-R "matched products" for the Mining Industry.

PRODUCTS DISPLAYED — MOST OF THEM NEW —

Jackhamers . . . Stopehamers . . . Drifters . . . Wagon Drills . . . Drill Mountings . . . Carset Jackbits . . . Air Compressors . . . Diesel Engines . . . Mine and Slusher Hoists . . . Air and Electric Tools . . . Centrifugal Pumps

549-14

11 BROADWAY, **Ingersoll-Rand** NEW YORK 4, N. Y.

Why the Champion Iron Mine uses "MS" Delay Caps Exclusively

HOLES PULL TO THE BOTTOM in the Champion Mine of the North Range Mining Company, Champion, Michigan, since Du Pont "MS" Delay Caps have been on the job. Most of the work consists of slabbing rounds with horizontal holes averaging eight feet deep. A typical stope shot uses "MS"-25 Delays in the top row of holes, and "MS"-50, -75 and -100 in the following rows. Several periods are skipped for the corner hole in the bottom row to sweep the bench of muck.

THIS OPERATOR REPORTS that with the use of Du Pont "MS" Delay Electric Blasting Caps, the holes are consistently pulling to the bottom, fragmentation is improved, little or no back break is evident and vibration and concussion have been materially decreased, thus improving safety in the stopes.

MINERS PREFER "MS" DELAYS because the short-length shell makes priming easier, and the brightly colored nylon-insulated leg wires are easy to identify and very resistant to abrasion.

DU PONT "MS" DELAYS come in 14 clearly marked periods ranging from 25 to 500 milliseconds. The caps are double-crimped with rubber plug closures, which makes them waterproof. Protective Cellophane-lined aluminum foil shielded shunts reduce the risk of premature detonation by stray currents.

★ ★ ★

Ask your Du Pont Explosives representative for complete information about "MS" Delay Caps. Let him show you why they have gained such wide approval by ore miners. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

For greater safety in ore work . . .

DU PONT "DETECT-A-METER"

Single instrument with two uses. Detects stray currents and also can be used as a blasting galvanometer. Provides quick check of circuits . . . promotes safety in ore mines and stripping operations.

DU PONT "NITRAMON"* AND "NITRAMEX"**

*"Nitramon" is a registered trade-mark for Du Pont nitrocarbonitrate blasting agent.

**"Nitramex" is a trade-mark for Du Pont ammonium nitrate blasting agent.

Designed for open-pit operations, "Nitramon" is the safest blasting agent made. Can't be detonated by a commercial blasting cap, friction, fire or by the impact of ball ammunition. Yet a relatively insensitive Du Pont "Nitramon" Primer detonates charges. Watertight containers permit loading far in advance of firing time.

"Nitramex" is a companion product of "Nitramon," designed for use where hard rock conditions are encountered. Finds wide application as a bottom load for extra energy at the toe.

Make a point of visiting the Du Pont Exhibit in Booth 213-215 at the Metal Mining Convention and Exposition of the American Mining Congress in Salt Lake City, Utah.
August 28—September 1, 1950.

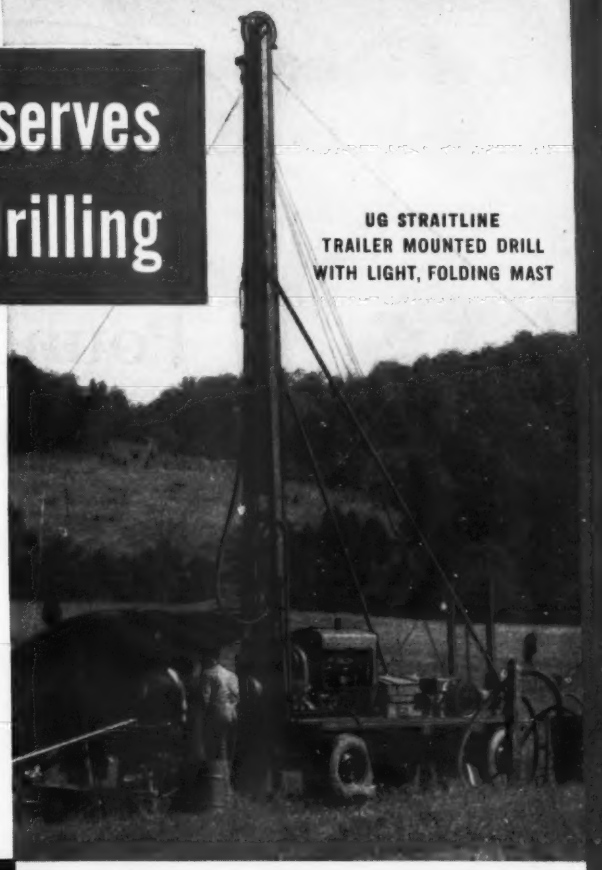
DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

DU PONT EXPLOSIVES

BLASTING SUPPLIES AND ACCESSORIES

Increase Mineral Reserves By Diamond Core Drilling

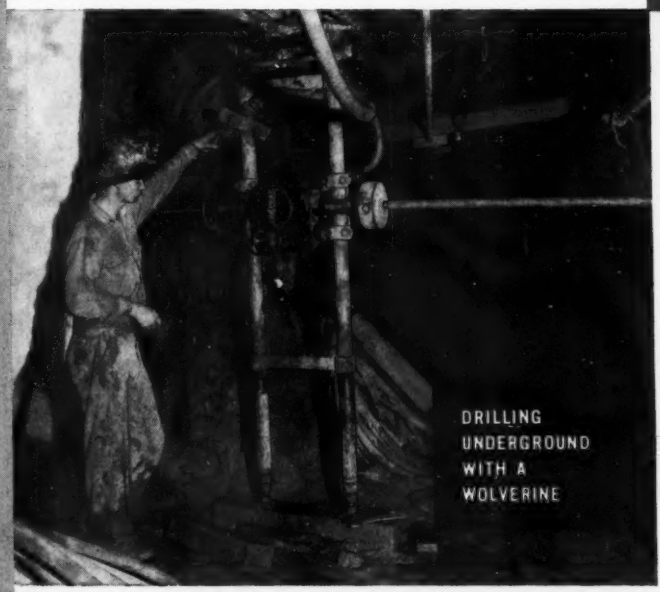


UG STRAITLINE
TRAILER MOUNTED DRILL
WITH LIGHT, FOLDING MAST

● Rich orebodies become worked out. Even reserves, once adequate, are dangerously low in many cases, yet the long term demand for minerals increases.

How is this challenge to be met? First of all, new deposits must and can be found by systematic exploratory search. Second, every effort should be made to expand present reserves.

The LONGYEAR organization will help you to accomplish the above objectives. It will supply you with drills suited to your job, or it will do your drilling under contract, if you prefer.



DRILLING
UNDERGROUND
WITH A
WOLVERINE

CORE DRILLING ON CONTRACT. In contracting your drilling to LONGYEAR, you gain the following advantages:

WITHOUT INVESTMENT *on your part, modern LONGYEAR core drills and equipment are available for your drilling projects.*

EXPERIENCED CREWS, *using the latest drilling techniques, carry out your exploratory program in accord with your wishes.*

YOU ARE PROVIDED *with accurate samples, most essential factors in your mineral search.*

DIAMOND CORE DRILLS. LONGYEAR manufactures a complete line of diamond core drills and equipment.

LIGHTWEIGHT, *easily set up machines are built for underground use.*

STURDY, *mobile equipment is available for rapid surface exploration.*

POWERFUL DRILLS *are made to meet the requirements of deep hole drilling.*

● CONSULT US ON THE PROBLEM OF INCREASING YOUR MINERAL RESERVES

E. J. LONGYEAR COMPANY

MINNEAPOLIS, MINNESOTA · NEW YORK OFFICE: 170 BROADWAY

CANADIAN LONGYEAR, LIMITED, NORTH BAY, ONTARIO, CANADA

DIAMOND CORE DRILLS • CONTRACT CORE DRILLING
SHAFT SINKING • GEOLOGICAL INVESTIGATIONS

REPRESENTATIVES IN PRINCIPAL MINING CENTERS IN THE UNITED STATES AND OTHER COUNTRIES

"We Get More Rock Per Round And Per Pound With The New ROCKMASTER "16" Blasting System!"

FROM drift and tunnel comes the word: "ROCKMASTER "16" *gives as much as 30% more footage per round!*" And many mine foremen claim that they accomplish this with less powder. Naturally, this adds up to more carloads of material per round and per pound.

There's more to the ROCKMASTER "16" story! *Sixteen* periods—a wide choice of short or long milli-second delays—give better control over throw, back-break, and material size. *Sixteen* delay periods fire within 550 milli-seconds!—there is less strain on timbers and roof . . . less dust and a quicker return to the face.

Underground and on the surface—in mines, pits, quarries, and construction jobs—you hear the same story: ROCKMASTER "16" is the greatest improvement in blasting methods since Atlas introduced milli-second blasting. It cuts drilling and secondary shooting . . . saves on time, labor, and dynamite. Ask your Atlas representative to show you where ROCKMASTER "16" fits into your operations.

See us at the
METAL MINING
Convention & Exposition

Salt Lake City
August 28-31

BOOTH 114

Our sales and technical personnel will be on hand to assist you with your blasting problems and explain how ROCKMASTER blasting can help you.

ROCKMASTER: Reg. U. S. Pat. Off.

ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington, Del. • *Offices in principal cities* • *Cable Address—Atpowco*

Scoops it, "loops" it, and unloads it with the help of TIMKEN® bearings

THIS new EIMCO 104 Rocker-Shovel, operating on the rocker-arm principle, can scoop a load, throw it overhead to discharge, and then return to the digging position in 15 seconds or less. It's rated at four to six yards a minute.

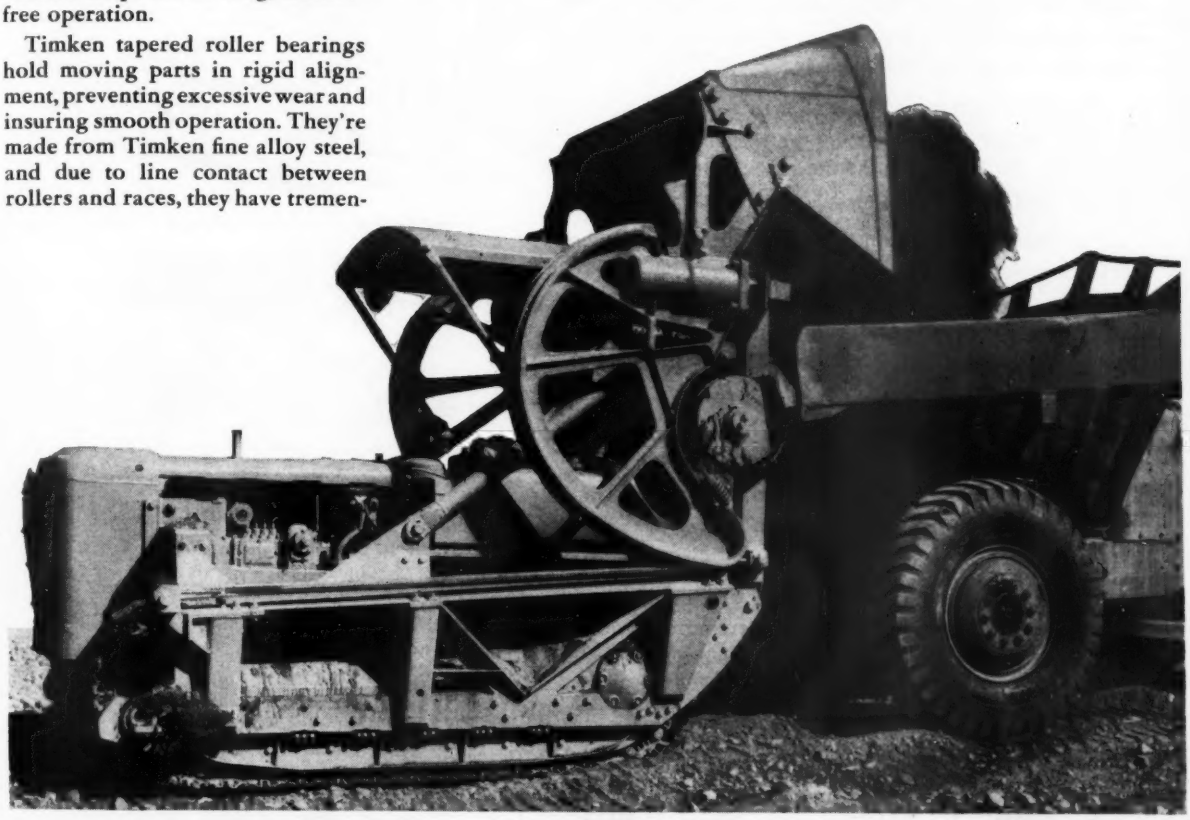
By using Timken® tapered roller bearings on the bucket driveshaft, reduction units and at vital points in the "Caterpillar" D4 Tractor on which the shovel is mounted, EIMCO helps insure long, trouble-free operation.

Timken tapered roller bearings hold moving parts in rigid alignment, preventing excessive wear and insuring smooth operation. They're made from Timken fine alloy steel, and due to line contact between rollers and races, they have tremendous load-carrying capacity. Even under the toughest loads, their true rolling motion and smooth surface finish enable Timken bearings to operate freely, frictionlessly.

Timken bearings permit the use of closures which effectively retain lubricant. They take any combination of radial and thrust loads and normally last the life of the machine.

No other bearing can give your equipment *all* the advantages you get from Timken bearings—backed by 50 years of bearing research and development. When buying construction machinery look for the Timken-equipped symbol. When buying bearings, look for the trademark "Timken". The Timken Roller Bearing Company, Canton 6, O. Canadian plant: St. Thomas, Ont., Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.

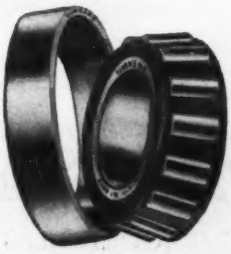


"BE SURE TO VISIT US AT
THE METAL MINING CONVENTION
AND EXPOSITION,
SALT LAKE CITY, UTAH
BOOTH 33"

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◫ AND THRUST →◫← LOADS OR ANY COMBINATION ✳

Lower your costs with these *McCarthy* shot-hole *Drills*

● McCarthy Blast Hole Drills bore shale and rock formations to produce deeper and truer blast holes in less time with less effort.

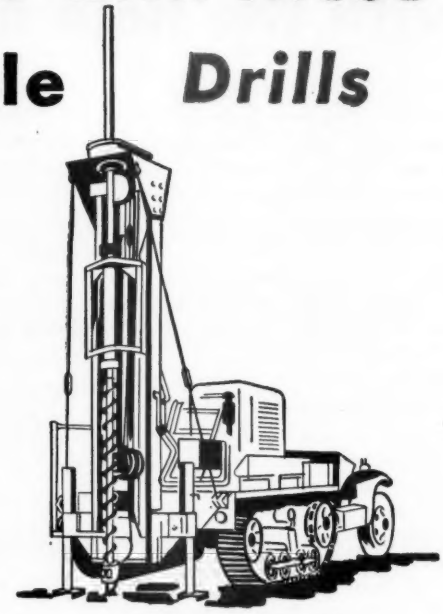
McCarthy Drills have heavier, more ruggedly built frames, with finger-tip controls, heavy-duty transmissions and alloy steel gears and shafts. Each unit is provided with an abundance of power, supplied from gasoline, diesel or electric motors.

Simplified designing permits increased mobility of both horizontal and vertical models . . . makes McCarthy the favorite in the field . . . the top performer of them all!

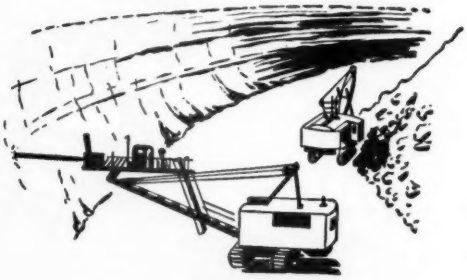
For high speed, high level drilling, there's the McCarthy Horizontal Drill for mobile mounting; there's a Self-Propelled, highly maneuverable unit for drilling blast holes close to the floor or bottom; and a compact, powerful Vertical Drill with a hydraulic tower that folds flat for travel.

Each of these McCarthy Drilling Units was developed for a specific job. Rigid tests prove conclusively that McCarthy Drills produce more footage at less cost than any other drills on the market.

Make the Salem Tool Company headquarters for all your drilling needs. Write now for information about how McCarthy Drilling equipment can increase your production and lower your blast hole drilling costs.



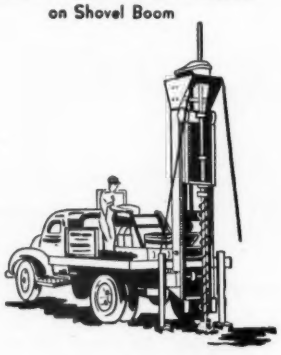
Vertical Drill Mounted on Half Track



Horizontal Blast Hole Drill Mounted on Shovel Boom

Truck Mounted Blast Hole Drill

Self-Propelled Blast Hole Drill



Vertical Blast Hole Drill

THE SALEM TOOL COMPANY

771 SOUTH ELLSWORTH AVENUE SALEM, OHIO, U. S. A.

SAFE DEPENDABLE POWER

SPEED UP your haulage and SAVE with EXIDE-IRONCLAD POWER

With Exide-Ironclads in your battery-powered shuttle cars, locomotives and trammers, you get all these time-saving, cost-cutting, tonnage-boosting benefits...

- instant starting and fast acceleration.
- safe, flexible haulage—quick car changes, less idle loader time, higher main line tonnage.
- uniform speeds maintained for entire shift.
- no unscheduled down time, hence more production per man per shift.
- low operating and maintenance costs.
- exceptionally long life.

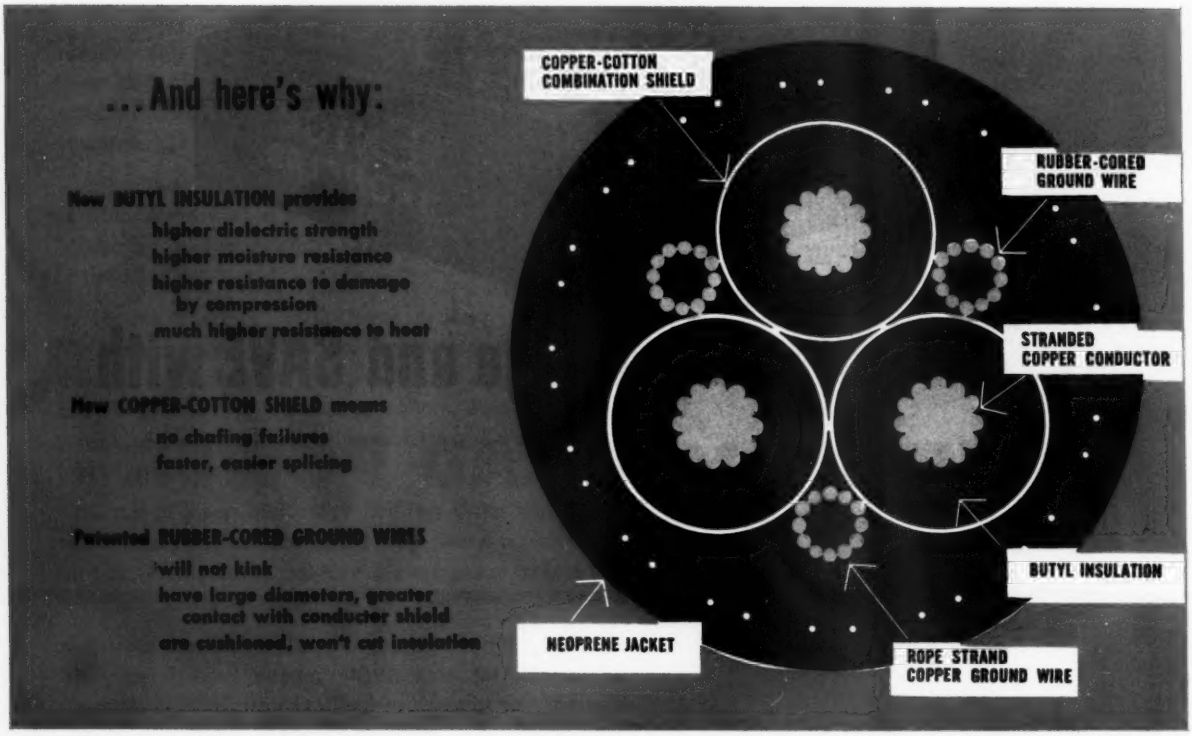
These advantages are made possible by the construction of the Exide-Ironclad which is different from any other battery. Its superior characteristics and long life—proved in more than 100,000 heavy duty jobs make the Exide-Ironclad Battery the best power buy—at any price.

THE ELECTRIC STORAGE BATTERY CO.
Philadelphia 32
Exide Batteries of Canada, Limited, Toronto

"Exide-Ironclad" *Reg. Trade-mark U.S. Pat. Off.*

1888 . . . DEPENDABLE BATTERIES FOR 62 YEARS . . . 1950

Now BUTYL makes Securityflex High Voltage Shovel Cable better than ever



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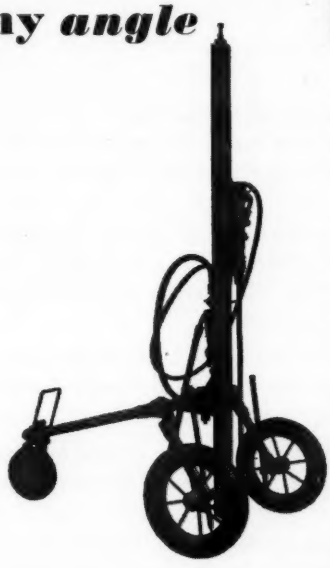

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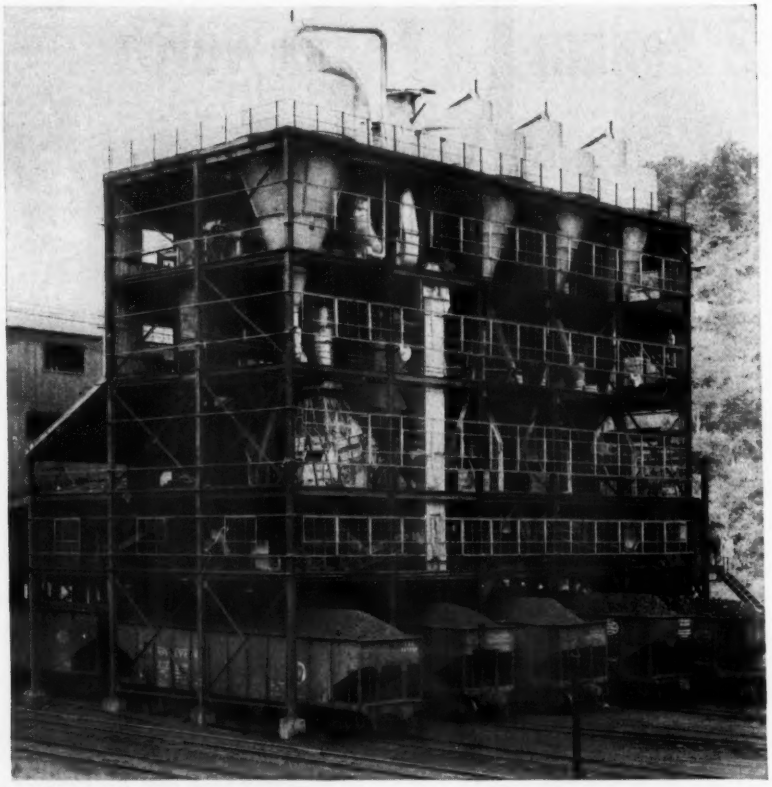

"Skeleton View" of Roberts and Schaefer - equipped dry cleaning plant at Trotter Coal Company's Bunker Mine, Cassville, W. Va.—photographed before steel siding was installed.

PREPARATION PLANTS NOW IN OPERATION SHOW

HOW TO DRY CLEAN LARGER COAL SIZES

R&S-equipped dry cleaning plant operated by Lion Coal Corp., Wattis, Utah—photographed before steel siding was installed.

Research in the field of dry cleaning coal has moved so fast that it's hard to realize what great strides have been made. But strides have been made . . . and the two air cleaning plants shown on this page are eloquent evidence of that fact.

Air cleaning up to 1¼-inch coal. Improved position in steam-coal market . . . raising shift capacity from 1700 to 2600 tons. That is a report on the R&S Super-Airflow units at Trotter Coal Company's Bunker Mine Plant, Cassville, West Virginia. (Illustrated above.)

Successful dry cleaning of sizes up to 1⅝-inches . . . ordering a second R&S Super-Airflow to double plant capacity: Lion Coal Corp., Wattis, Utah. (Illustrated at the left.)

Entire mine output crushed to 1¼-inches and dry cleaned by Roberts and Schaefer Company Super-Airflow units . . . reports American Eagle Collieries of Southern West Virginia.

A good idea: When you are looking for future improvements in dry cleaning of coal, do as these companies did—consult with Roberts and Schaefer Company.

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Those Scarce Strategics

FIVE years of perilous peace have passed—a period that has demanded the clearest thinking in order to avoid repetition of the circumstances of 1939. Then, genuine concern over possible wartime shortages resulted in the passage of the Strategic Materials Act—one provision of which was intended to establish "underground stockpiles" of mineral in place and to step up production of minerals and metals in short supply.

In 1939 seven metals were classed as strategic—antimony, chromium, manganese, mercury, nickel, tin and tungsten. Today approximately 50 metals and minerals are included in this category, and events dictate immediate action to assure an adequate supply beyond the capacity of a military stockpile now less than 40 percent complete.

In a decade of search for strategic materials, more than 10,000 projects were conducted on deposits of 33 different commodities. The U. S. Bureau of Mines cost alone for the period 1939-1949 was $29,171,927, in addition to funds expended by the U. S. Geological Survey. Substantial production for World War II was attained in antimony, barite, celestite, mercury and tungsten. But in only eleven cases has private industry found it worth while to develop commercially deposits tested during the program.

Thus, it would appear that an unusually high cost in manpower and money was paid for the actual contributions made to mineral raw material supply during the war years. Such is necessarily the case as a lot of money was spent in obtaining negative information on many hopelessly lean or small deposits. Paralleling the experience of the mining industry, only a small proportion of the properties examined warranted detailed study or the setting up of a project. Also, it takes time and money to determine the potentialities of a single large deposit and additional expenditures to bring it into production. Commercial development and operation of a few mines, however, could result in tax revenues exceeding the total sum the Bureau of Mines expended on this program.

Unfortunately, private investment in domestic mining has not been encouraged. The blood-letting of unjust taxation, competition from low cost foreign metals, and rising production costs have drained off funds normally risked in exploration and development. Incentive has been reduced below the point where realization is commensurate with the risk and we have experienced the steady decline of mining pointed out on this page in July.

Today minerals and metals are again a matter of vital concern. Great significance is now attached to the fund of basic knowledge contained in a Bureau of Mines report filed on some 15,000 examinations by both private operators and State and Federal agencies concerned with minerals. Even the sub-marginal and marginal deposits studied in the Bureau's strategic minerals development program loom in importance as international tensions rise.

The true measure of the results of the many projects undertaken may well be revealed in the immediate future. Private industry has the production know-how and the machinery, equipment and organization to do the job of mineral and metal supply. Restore to mining those economic conditions attractive to risk capital and the domestic industry can do its part to flex the martial muscles of our enormous industrial strength and capacity for mass production.

Coal is Ready

POTENTIAL productive capacity of the coal mining industry stands today at a higher point than at the outset of World War II. Then, coal had suffered a fifteen year period of repeated annual losses and declining markets. But with surprising vitality, coal almost doubled production, at the same time contributing great numbers of its trained manpower to the armed forces. Even with inadequate equipment replacements, production was maintained and in some cases increased with machinery reclaimed from the scrap pile.

Since the war, development and expansion programs have been dusted off and vigorously put into effect. Mechanization has progressed at a rapid pace to improve underground and open-pit production, with great safety advances.

Oil and gas are now at a peak of production and industrial supplies may be reduced as greater amounts are diverted for military use. The flood of foreign oil would go down to a dribble, if enemy action should choose to cut supply. In contrast to this picture, coal can not only take care of increased consumption by existing users but can meet the demands of those who will have to rely on coal in the event of shortages of competing fuels.

To do this fundamental task, the coal industry requires three things: first, it must be allowed to retain its trained manpower; second, it must be supplied with repair parts, materials and new machinery to keep existing plant in top operating condition, and to boost man output, and third, it must be furnished adequate transportation for delivery of its product. Provided these needs are met, this forward-looking, private industry will again perform productive miracles to meet all fuel requirements of another emergency.

National Film Board.

An amphibious helicopter hovers over a mapping party. In Ungava these tiny flying craft save much time and walking, as they can transport 600 lb of surveyor and equipment to the exact site

Northern Iron Ore Meets Strategic Needs—Part I

Hollinger-Hanna Combined Efforts Develop Important Accessible Reserves

By JOHN E. KELLY
Consulting Engineer
Parkersburg, W. Va.

DEPLETION of Lake Superior high grade iron ores, particularly on the Mesabi Range, focuses attention on new deposits that can meet future abnormal needs for national defense as well as the steel industry's peacetime demands of approximately 100,000,000 tons annually. When, in the last years of World War II, it became evident that the high grade ores of the Mesabi range had been greatly depleted, American steel makers undertook an intense search for substitute reserves. The search was successful to such degree that in the opinion of some observers, a buyers' market in iron ore might occur by the middle 1950s with consequent sharpening competition and hard sledding for smaller and high cost producers.

Nearly all available deposits of major size that may complement or supplant Mesabi, producing or in process of development, are located along the shores of the Atlantic Ocean. High grade reserves susceptible of export to the United States exist in Sweden, Spain, Morrocco, French West Africa, Liberia, Brazil, Venezuela and Canada. Others, lesser known or of smaller extent, are reported in Colombia, the Dominican Republic, the Guianas, Mexico and elsewhere. Iron mining is mass production with profits figured in pennies per ton, while hundreds of millions of dollars may be required to develop a property to the point of production, including construction of rail and water transportation systems. It is economically essential, therefore, that iron producers be able to ship as continuously as possible; national defense requires uninterrupted delivery in time of war.

This latter consideration tends to narrow the field in which new deposits may be located. During the last war many ore carriers were lost to enemy action and it must be expected that with a hostile general staff aware of Mesabi's depletion, all possible effort will be made to cut off American steel plants from their overseas sources of

National Film Board.

Drilling a lens of hematite ore in one of the rare wooded areas of Ungava. Spruce are the only trees noted and they grow only in sheltered coves out of the wind

ore. As between properties of equal grade and size, those protected by location enjoy a logistic preference over competitors separated from their markets by vulnerable ocean transit.

Strategic Location

Strategically, Mesabi's location is ideal, safe from hostile attack as far as may be in this air age. This immunity is shared by the smaller Canadian deposits such as Steep Rock and Michipicoten and, almost to the same degree, by the reserves in southern Ungava along the Labrador-Quebec provincial frontier. In case of need, Labrador ore could be delivered directly to American steel centers by rail save for the crossing of the St. Lawrence River. The gap of 140 miles from the Labrador terminus of Seven Islands to Mont Joli on the south shore, on the main line of the Canadian National Railway, leads over shallow waters west of Anticosti Island, defensible by nets in Mingan Strait and with mines and destroyers in the southern channel.

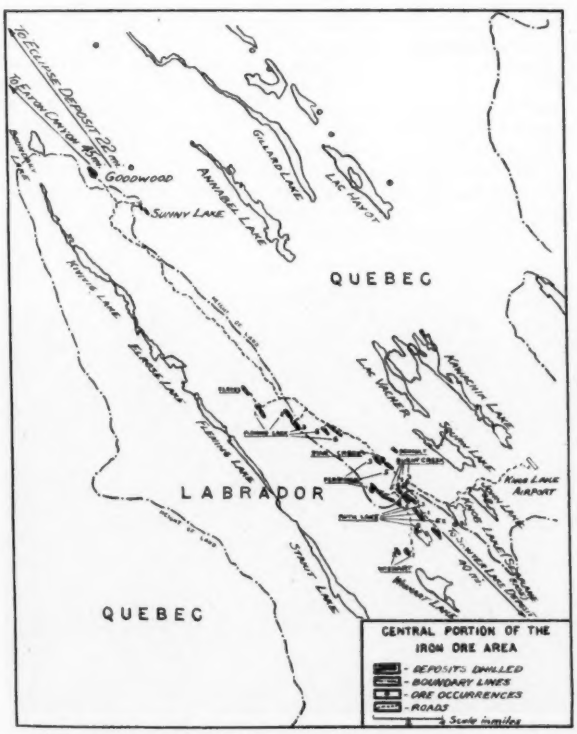
The Hollinger-Hanna concessions lie in the southern end of the so-called Ungava Trough, a mineralized synclinal belt extending north-northwest some 400 miles, from Lake Ashuanipi (longitude 66 deg West, latitude 53 deg North) to the west shore of Ungava Bay on Hudson Strait. Hollinger's exploration permits comprise an area

In the bleak and unpopulated land of Ungava, exploration drilling has proved, with reasonable accuracy, the existence of 350,000,000 tons of good grade direct shipping open-pit iron ore and manganiferous iron ore. The possibility of uncovering much greater reserves indicates the future prominence of these deposits as an important source of iron ore supply. Part II will tell the story of new developments at the Wabana deposit on Belle Isle, Newfoundland.

larger than Vermont and New Hampshire, or equivalent to an Equatorial belt one mile wide around the earth. In the Minnesota iron ranges the mineralized zone is approximately 110 miles long, varying in width from one to five miles. Production is attained over some 70 miles. Hollinger's mineralized zone measures 225 miles long by 10 to 60 miles wide. High grade ore has been found over a distance of 90 miles, and geologic indications persist that it extends both north and south.

The remaining high grade Mesabi ores are hidden by overburden, varying from 70 to an occasional 200 ft in thickness, adding greatly to the cost of exploitation. In Ungava the overburden averages five feet—the deepest seen by the writer being 14—while vast stretches of ore are completely exposed. Since the overburden is largely decomposed rock, there is almost no soil and hence very little forest cover. What there is consists mostly of Eskimo moss, the shrub known as "Labrador Tea" and, in sheltered spots, stunted spruce. All of this scanty growth is tinder-dry in summer and great stretches have been laid bare by lightning fires.

Ungava appeared on the iron ore map in 1893, following the visit of Dr. A. P. Low of the Canadian Geological Survey. He found great bands of ironbearing rocks, similiar geologically to those of the Minnesota Ranges, in the Ungava Trough. Dr. Low's report gathered dust in Ottawa, for Victorian Canada had no steel mills and transportation was unthinkable. There are no roads into Ungava and white water in the rivers makes even canoe journeys backbreaking toil. To this day the only feasible



With vast areas yet to be explored, iron ore has been found for over a distance of 90 miles

Cross-hatched sections illustrate the entire concessions, an acreage as great as New Hampshire and Vermont combined

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Labrador Mng. & Exploration Co.

(Left) A portable diamond drill rig mounted on a half-track, at work on the property of Labrador Mining & Exploration Co., Ltd. (Right) Trenching across a showing of manganese-iron ore. Shown is the heaviest overburden encountered, from 6-14 ft. The shovel and its crew, together with all supplies and food, were flown in

entry is by air—Hollinger-Hanna have spent some $7,000,000 in airborne prospecting, flying in power shovels, food and men, at costs up to 72¢ per pound. The innovation paid handsomely, the 358,000,000 tons of high-grade hematite developed to date cost thus less than two cents per ton. No old-time prospector with burro and rock hammer could operate as economically.

In 1936 an Indian trapper came out of Ungava with a chunk of ore that popped eyes wherever mining men saw it, hematite running 68 percent iron. The outcome was formation of the Labrador Mining & Exploration Co., Ltd., later acquired by Hollinger.

Good Grade—High Tonnage

The average grade of ore developed on the Hollinger-Hanna concessions is 55.5 percent iron content. Since only about 15 percent of the holdings have been even cursorily explored, and within that category attention has been directed almost entirely to deposits exposed by wind, fire or erosion, it seems probable that total recoverable ore will exceed a billion tons of direct-shipping hematite, low in phosphorous, silica and sulphur. In the eastward portion of the concessions lie perhaps an equal amount of taconites running to 40 percent iron. No consideration has been given thereto in Hollinger's estimates of ore available.

The ore deposits of southern Ungava take the form of lenses, planed by the ice sheets that, in several geological ages, formed on this high plateau. The lenses, containing up to 30,000,000 tons of ore apiece, and up to 10 miles in length, have been found scattered in an irregular pattern within the borders of the Trough (see map herewith). Many others doubtless occur under the light overburden. When testing a churn drill at the Burnt Creek camp, ore was found which maintained its high quality when the bit stopped 367 ft down. Bulldozers, smoothing the jeep roads that fan out from Burnt Creek, uncovered high grade ore in several localities which the management as yet lacks time to explore. With exception of the lense on which the camp stands, every deposit drilled to date was discovered as a surface outcrop. Most of the southern Ungava ore is hematite, with magnetite, siderite and limonite appearing in small quantities toward the northern boundary. Some qualified observers class Ungava as exceeding Mesabi in the latter's prime.

Domestic Interests Assure Supply

Partners in the southern Ungava concessions are Hollinger Consolidated Gold Mines, Ltd., Canada's premier gold producer with a dividend record exceeding $125,000,000, and the M. A. Hanna Co. of Cleveland, Ohio, operating in Canada through a subsidiary, Hanna Coal & Ore Corp. The concessions are held by Labrador Mining & Exploration Co., Ltd., with 20,000 sq miles of exploration rights in the western panhandle of that little known region, and Hollinger North Shore Exploration Co., Ltd., holding 3900 sq miles in Quebec, north of and adjoining the Labrador concession. The concessionaires have a period of five years in which to complete exploration and select areas to be held for long periods—80 years in Quebec, 90 in Labrador.

Hollinger owns 51 percent of the outstanding shares of Labrador Mining & Exploration Co., which is listed on several Canadian stock exchanges, with an active public interest. Hanna owns 18 percent of Labrador and 40 percent of Hollinger North Shore Exploration, Hollinger Gold Mines holding the balance. The partners own jointly port, power, railway and aviation companies serving the development.

Labrador Mng. & Exploration Co.

Base exploration camp of Burnt Creek, in New Quebec, Canada, looking south into Labrador. The massif in the middle distance, center, is largely iron ore

Total cost of development of the huge holding is estimated at $200,000,000. To assist in financing, the partners have contracted with five major American steel producers, including all of the largest companies excepting only United States Steel, Bethlehem and Jones & Laughlin. Armco, National, Republic, Wheeling and Youngstown Sheet & Tube, together with Hollinger and Hanna doubling in brass, have formed a Delaware corporation, the Iron Ore Co. of Canada, with a capitalization of $170,000,000, including $30,000,000 in common shares. In return for a payment of $5,000,000 in cash and a like amount in stock, a royalty of 7 percent of the selling price of its ore at the Saint Lawrence port of Seven Islands, Quebec, the Iron Ore Co. of Canada has received options on certain portions of the concessions, marked "Area A" and "Area B" on the map herewith. The exploration rights optioned cover 500 sq miles in each of the Quebec and Labrador concessions, from which the Iron Ore Co. of Canada may within five years select and retail for mining, 250 sq miles in each zone.

Dr. A. A. Retty, chief geologist of the concessionaires and the man who knows Ungava best, from almost continual exploration since the early 1930s, estimates the tonnage of high-grade ore indicated by drilling, to the close of 1949, in Area "A" (Quebec) at 240,840,000 long tons, and that in Area "B" at 114,175,000 gross tons. The partners have reserved to themselves the greater part of each concession. The reservation includes a minimum of 75,000,000 tons of drilled ore. This tonnage will be available for sale, directly by the concessionaires, to customers in Great Britain, Canada, New England and elsewhere. It is assumed that the bulk of the ore moved by the Iron Ore Co. of Canada will be for account of the American steel makers participating therein.

The option provides that on or before December 31, 1953, the Iron Ore Co. will have the right to lease areas containing the following tonnages of merchantable open-pit ore of average grade, quality, cost and availability: first 200,000,000 tons, all; second 200,000,000 tons, 50 percent; over 400,000,000 tons, two-thirds.

The agreement requires the Iron Ore Co., upon exercising its option to lease, to "build and equip a suitable railway from the mines to Seven Islands, P. Q., with suitable docks to ship and deliver a minimum of 10,000,000 tons of iron ore per year; to equip and operate suitable mines for the production of a like minimum annual tonnage; to construct sufficient dwellings and other facilities and to develop and supply sufficient electric power." These are major obligations: rail construction is calculated at $50,000,000 with an equal amount for rolling stock. The port works are budgeted at $15,000,000. As much or more will be spent on a 40,000 hp hydroelectric plant at Eaton's Canyon in the northwestern corner of the Quebec concession and a 7000 kw generating station near Seven Islands.

Construction Plans Speed Up

Those interested in the Ungava iron deposits are not waiting for options to mature but have speeded up their schedule, perhaps spurred by South American competition. Plans for the port of Seven Islands, including a 2000 ft mooring dock, utility dock, rotary dumpers, stockpile and handling equipment, conveyor belts, shovels, loading hoppers and boom ship loaders, were scheduled for completion in April 1950. Final surveys for the 360 miles of railway from Seven Islands to the mine headquarters at Burnt Creek, on the Quebec-Labrador border, will be finished this summer, a year ahead of schedule. That would allow railway contracts to be let this autumn, and the bulk of construction equipment moved in during the winter of 1950-51.

There is no muskeg or permafrost along the route. For 200 miles south of Burnt Creek the maximum gradient against loaded trains will not exceed 0.2 percent. Thereafter the land descends to sea level at the St. Lawrence. Many stretches of Canada's rail system traverse rougher country with harder operating conditions. Access to Pittsburgh requires cuts and fills greater than obtaining on the Quebec North Shore & Labrador Railway. The first hundred miles from

(*Continued on page* 61)

National Film Board.

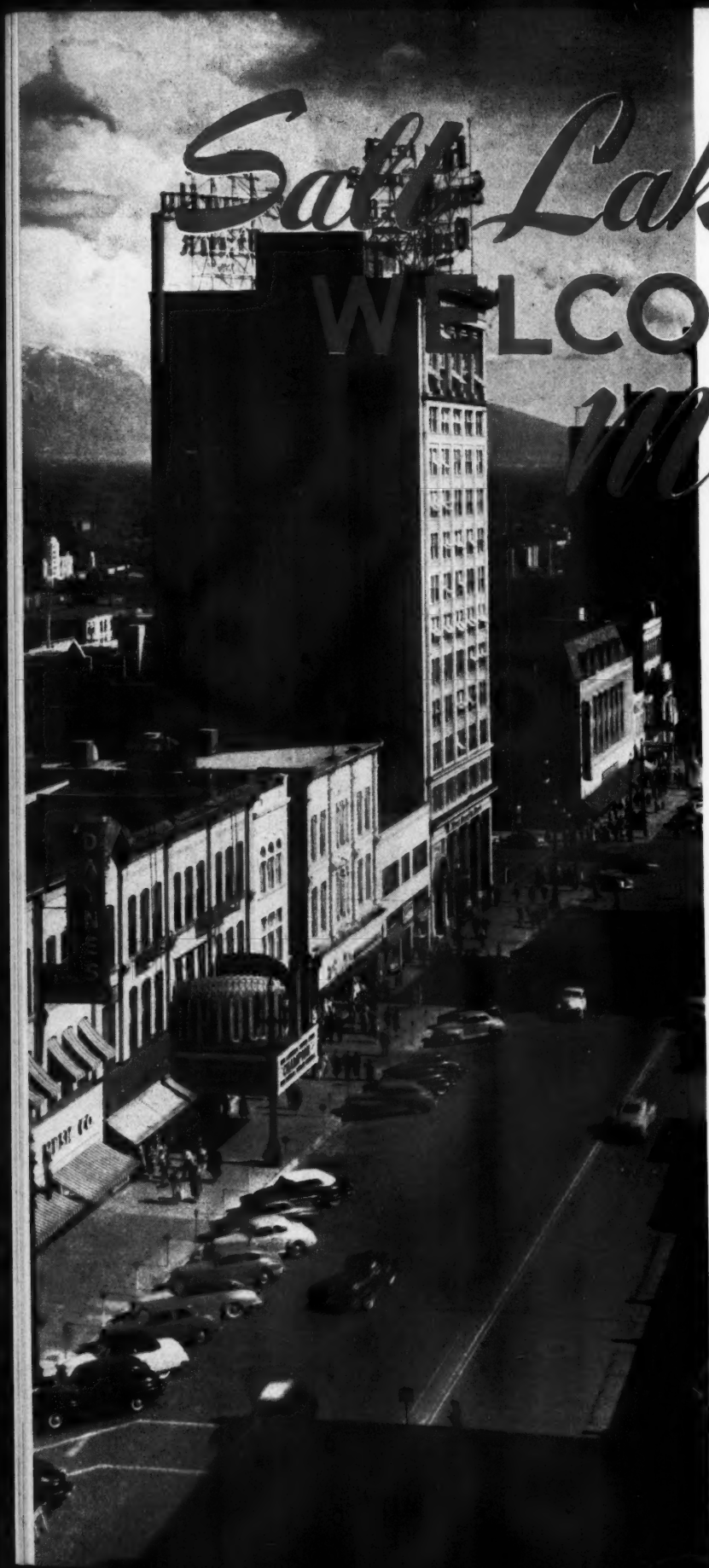
Test drilling an orebody in typical terrain of the Ungava Trough. The crew is waist deep in "Labrador tea," used by the Eskimos when the white man's stores run short

National Film Board.

Churn-drilling crew in Ungava. Black flies are so rare that neither masks nor lotion are commonly used. The working day is 12 hours and crews such as these usually camp out, supplied by daily visits by jeep or light plane

Labrador Mng. & Exploration Co.

One of the pair of DC-3s that maintain daily service between the base camp at Burnt Creek and the air base at Mont Joli, Quebec, 431 miles due south. All personnel and equipment have been flown in, from flour to power shovels. Original air transport cost was 72c per lb. (Foreground: center, hatless, W. H. Durrell, general manager, and right, Jules Timmins, president, Labrador Mining & Exploration Co., Ltd.



Salt Lake City WELCOMES Miners

West's Mining Center Scene of Mid-Century Meeting to Analyze Industry Problems

MINING MEN from all over the United States will convene in the shadow of the Wasatch Mountains, August 28-31, to discuss current problems and lay plans for the future. At this outstanding mile-post meeting, every phase of the industry, from exploration, development and production through questions of general economic and legislative importance, will be critically examined in the light of mining's vital role in the nation's defense.

An unequalled Exposition of mining machinery, equipment and supplies will be assembled at the State Fair Grounds. Together with the timely papers and discussions, this comprehensive display offers mining men an exceptional opportunity to obtain first-hand knowledge of the course that future production practices are most likely to follow.

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M. I. SIGNER
Colorado School of Mines

R. H. SUMMER
E. I. du Pont de Nemours & Co., Inc.

IDAHO

J. E. BERG
Federal Mining & Smelting Co.

JOHN D. BRADLEY
Bradley Mining Co.

M. C. BROWN
Sidney Mining Co.

DONALD A. CALLAHAN
Callahan Consolidated Mines, Inc.

A. W. FAHRENWALD
University of Idaho

ROLLIN D. FARMIN
Day Mines, Inc.

J. B. HAFFNER
Bunker Hill & Sullivan Mining & Concentrating Co.

L. E. HANLEY
Hecla Mining Co.

J. C. KIEFFER
Spokane-Idaho Mining Co.

ROSS D. LEISK
Sunshine Mining Co.

R. W. LOTTRIDGE
Federal Mining & Smelting Co.

HARRY W. MARSH
Idaho Mining Assn.

STANLEY W. MCDOUGALL
Bunker Hill & Sullivan Mining & Concentrating Co.

L. J. RANDALL
Hecla Mining Co.

A. H. SHOEMAKER
Triumph Mining Co.

J. R. SIMPLOT
J. R. Simplot Co.

WALLACE G. WOOLF
Sullivan Mining Co.

MONTANA

W. R. ALLEN
Elkhorn Beaverhead Mines Co.

ROBERT J. ARMSTRONG
Montana Phosphate Products Co.

A. C. BIGLEY
Anaconda Copper Mining Co.

LESTER F. BISHOP
Anaconda Copper Mining Co.

E. R. BORCHERDT
Anaconda Copper Mining Co.

C. R. BRAZIER
Golden Messenger Corp.

RUSSELL B. CAPLES
Anaconda Copper Mining Co.

O. P. CHISHOLM
Little Bonanza Mine

KUNO DOERR, JR.
American Smelting and Refining Co.

M. H. GIDEL
Anaconda Copper Mining Co.

R. H. GLOVER
Anaconda Copper Mining Co.

A. E. HAESELER
Mike Horse M. & M. Co.

D. M. KELLY
Anaconda Copper Mining Co.

F. A. LINFORTH
Anaconda Copper Mining Co.

A. B. MARTIN
Montana Power Co.

E. S. MCGLONE
Anaconda Copper Mining Co.

W. E. MITCHELL
Anaconda Copper Mining Co.

J. B. MYERS
Zonolite Co.

W. A. NOON
H. & H. Mines

ROBERT P. PORTER
Porter Bros. Corp.

JOSEPH T. ROY
American Smelting and Refining Co.

R. H. SALES
Anaconda Copper Mining Co.

R. B. SHELLEDY
Montana Phosphate Products Co.

CHESTER H. STEELE
Anaconda Copper Mining Co.

Program Committee—continued . . . .

A. V. TAYLOR, JR.
The Taylor-Knapp Co.

FRANCIS A. THOMSON
Montana School of Mines

CARL J. TRAUERMAN
Mining Association of Montana

NEVADA

J. H. BUEHLER
Bristol Silver Mines Co.

J. RAY COULTER
U. S. Vanadium Corp.

H. D. DUDELMAN
Tonopah

W. G. EMMINGER
Nevada-Massachusetts Co.

L. D. GORDON
Round Mountain Dredging Co.

J. O. GREENAN
Greenan & Co., Inc.

W. J. HENLEY
Dayton Consolidated Mines Co.

J. C. KINNEAR, JR.
Kennecott Copper Corp.

ARTHUR J. O'CONNOR
Consolidated Coppermines Corp.

ROBERT H. RARING
Copper Canyon Mining Co.

HENRY M. RIVES
Nevada Mine Operators Assn.

CHAS. H. SEGERSTROM, JR.
Nevada-Massachusetts Co.

ALBERT SILVER
Reno

NEW MEXICO

E. S. BOWMAN
Banner Mining Co.

T. M. CRAMER
U. S. Potash Co.

L. H. DURIEZ
U. S. Smelting Refining & Mining Co.

C. S. ELAYER
Silver City

WILLIAM H. GOODRICH
Kennecott Copper Corp.

G. T. HARLEY
International Minerals & Chemical Corp.

VINCENT C. KELLEY
University of New Mexico

H. E. MCCRAY
Burro Chief Mines

J. C. PIERCE
New Mexico Miners & Prospectors Assn.

T. A. SNEDDEN
American Smelting & Refining Co.

IRA L. WRIGHT
Black Hawk Consolidated Mines Co.

OREGON

FAY I. BRISTOL
Bristol Silica Co.

P. R. HINES
Portland

G. P. LILLEY
Baker Dredging Co.

ERNEST A. MESSER
Messer, Toye & Associates

S. H. WILLISTON
Cordero Mining Co.

SOUTH DAKOTA

ALBRO C. AYRES
Black Hills Mining Assn.

KENNETH C. KELLAR
Kellar & Kellar

D. E. MOULDS
Bald Mountain Mining Co.

TEXAS

ADIN A. BROWN
American Smelting & Refining Co.

E. B. GERMANY
Lone Star Steel Co.

M. W. HAYWARD
El Paso

O. D. NIEDERMEYER
National Lead Co.

EUGENE M. THOMAS
Texas Western College

H. E. TREICHLER
Texas Gulf Sulphur Co.

R. A. YOUNG
American Zinc Co. of Illinois

UTAH

R. D. BRADFORD
American Smelting & Refining Co.

BURT B. BREWSTER
Mining & Contracting Review

LOUIS BUCHMAN
Kennecott Copper Corp.

W. H. H. CRANMER
New Park Mining Co.

CECIL A. FITCH, JR.
Chief Consolidated Mining Co.

JAMES E. HOGLE
Rico Argentine Mining Co.

WALTER M. HORNE
Utah Mining Assn.

P. H. HUNT
Park Utah Consolidated Mines Co.

A. G. MACKENZIE
Salt Lake City

WALTHER MATHESIUS
Geneva Steel Co.

D. D. MOFFAT
Salt Lake City

W. J. O'CONNOR
American Smelting & Refining Co.

W. C. PAGE
U. S. Smelting Refining & Mining Co.

JAMES K. RICHARDSON
Kennecott Copper Corp.

P. J. SHENON
University of Utah

E. H. SNYDER
Combined Metals Reduction Co.

F. A. WARDLAW, JR.
International Smelting & Refining Co.

STUART R. ZIMMERLEY
U. S. Bureau of Mines

WASHINGTON

JOHN BLEY
Howe Sound Co.

WELLMAN CLARK
Spokane

DWIGHT L. HARRIS
Washington State College

FRANK LILLY
Prospectors & Mine Owners Assn.

H. F. MILLS
American Zinc, Lead & Smelting Co.

W. D. NESBEITT
Allis-Chalmers Manufacturing Co.

ROGER O. OSCARSON
Northwest Mining Assn.

T. L. PITTMAN
Knob Hill Mines, Inc.

GLENN E. SIGLER
American Smelting & Refining Co.

H. F. YANCEY
University of Washington

H. A. ZIEBELL
Northwest Magnesite Co.

TRI-STATE DISTRICT

E. H. CRABTREE, JR.
Eagle-Picher Mining & Smelting Co.

H. W. HARRISON
Eagle-Picher Mining & Smelting Co.

J. P. LYDEN
Eagle-Picher Mining & Smelting Co.

D. S. SIMS
Miami, Oklahoma

DAN R. STEWART
American Zinc, Lead & Smelting Co.

C. E. STOVER
Tri-State Zinc & Lead Ore Producers Assn.

LAKE SUPERIOR DISTRICT

RUSSELL H. BENNETT
Electro Manganese Corp.

F. H. CASH
Republic Steel Corp.

A. J. CAYIA
Inland Steel Co.

R. T. ELSTAD
Oliver Iron Mining Co.

R. C. FISH
M. A. Hanna Co.

HUGH H. HARRISON
Pacific Isle Mining Co.

M. D. HARBAUGH
Lake Superior Iron Ore Assn.

T. L. JOSEPH
University of Minnesota

GROVER E. LEVEQUE
Inter-State Iron Co.

C. W. NICOLSON
North Range Mining Co.

W. S. MOORE
W. S. Moore Co.

RAY D. NOLAN
Minnesota Dept. of Conservation

J. MURRAY RIDDELL
Michigan College of Mining & Technology

O. A. ROCKWELL
Calumet & Hecla Consolidated Copper Co.

F. J. SMITH
Oglebay Norton & Co.

CHARLES J. STAKEL
Cleveland-Cliffs Iron Co.

O. A. SUNDNESS
Snyder Mining Co.

EASTERN STATES

FRANK A. AYER
Copper Range Co.

C. KREMER BAIN
St. Joseph Lead Co.

FRANK EICHELBERGER
Vermont Copper Co., Inc.

ERNEST V. GENT
American Zinc Institute

J. C. GRAY
Tennessee Coal, Iron & RR Co.

WARREN HASTINGS
New Jersey Zinc Co.

E. B. JENNINGS
Universal Exploration Co.

EVAN JUST
Engineering & Mining Journal

PHILIP KRAFT
Newmont Mining Co.

W. J. LINNEY
Republic Steel Corp.

LAWRENCE LITCHFIELD, JR.
Alcoa Mining Co.

T. A. MITCHELL
Tennessee Copper Cp.

R. S. NEWLIN
Anaconda Copper Mining Co.

KENNETH B. RAY
American Smelting & Refining Co.

ALLAN R. REISER
National Lead Co.

JAMES R. SWEET
Tungsten Mining Corp.

T. M. WARE
International Minerals & Chemical Corp.

ROBERT L. ZIEGFELD
Lead Industries Assn.

MINING EQUIPMENT MANUFACTURERS

JOHN P. COURTRIGHT
Marion Power Shovel Co.

W. J. FLEMING
Worthington Pump & Machinery Corp.

J. H. FULFORD
Jeffrey Manufacturing Co.

WILLIAM E. GOODMAN
Goodman Manufacturing Co.

R. W. HERNLUND
Western Machinery Co.

J. S. HUBBARD
Humphreys Investment Co.

E. H. JOHNSON
Kennametal Inc.

W. A. NUGENT
Independent Pneumatic Tool Co.

C. B. PECK
Anaconda Wire & Cable Co.

E. R. PHILLIPS
Pittsburgh Gear Co.

E. M. PLATTS
Joy Manufacturing Co.

C. H. ROBERTS
Traylor Engineering & Manufacturing Co.

JOSEPH ROSENBLATT
Eimco Corp.

GEORGE E. STRINGFELLOW
Thomas A. Edison, Inc.

J. B. TERBELL
American Brake Shoe Co.

JOHN WALKER
Mack-International Motor Truck Corp.

C. G. WILLARD
Mine & Smelter Supply Co.

G. V. WOODY
Allis-Chalmers Manufacturing Co.

Men from all branches of the metal and nonmetallic mining industries will find the program of this top mining meeting of the year aimed at their interests. Every mineral production activity plus questions of wide general interest will be given detailed attention in the 13 sessions that have been arranged by a capable nationwide Program Committee, headed by Roy A. Hardy of Nevada.

General topics have been grouped together in seven of these sessions covering the outlook for metals; stockpiling for national defense; tariff and taxation; safety and labor relations; foreign aid and monetary problems; public land policies; problems of the small mine operators; atomic energy developments, and public relations.

Specialized matters relating to more economic ore production will be covered in six sessions that will shed light on new methods and practices. Widely experienced operating men will discuss a broad range of topics including "packaged" timber handling; hydraulic hoisting; operating factors in heavy-media separation; rod mill liners; geochemical prospecting; roof bolting; truck haulage power plants; Howe Sound's new cobalt mine; trackless mechanized mining; problems of underground rock breaking; progress in developing the White Pine ore body; rock drill bits; drill steel; the fluo-solids process; and plans for treating Greater Butte Project ores. Panel discussions and symposiums on a number of the subjects, questions, and discussion from the floor will bring forth a full measure of information on these topics.

Authorities Take Active Part

A large number of nationally-known figures are participating in the meeting and will give the industry the benefit of their special experience and knowledge. Included among representatives of the Federal Government will be Senator Harry P. Cain of Washington; Representative Clair Engle of California; Representatives Carl T. Durham and Graham A. Barden of North Carolina; Assistant Secretary of Interior C. Girard Davidson; Carl Rolle of the Munitions Board; R. L. Wilcox of the ECA, and Sumner T. Pike, Jesse C. Johnson and Frank H. MacPherson of the Atomic Energy Commission.

Outstanding men of the mining industry taking an active part in the program include Howard I. Young, President of the American Mining Congress and president of the American Zinc, Lead and Smelting Co.; Roy A. Hardy, Chairman of the Program Committee and consulting engineer in charge, Getchell Mine, Inc.; D. D. Moffat, Chairman of the Western Division of the American Mining Congress; and M. L. McCormack, Chairman of the Manufacturers Division of the American Mining Congress and manager of rock drill sales, Ingersoll-Rand Co. The large cooperative group who are giving so generously of their time and efforts to present their views to the industry has the wholehearted thanks of the entire mining industry.

Committees Deserve Praise

High commendation is due the Western Division of the American Mining Congress for staging an unusually valuable meeting under the competent leadership of D. D. Moffat, general chairman of the Salt Lake Committees, together with James K. Richardson, vice-chairman.

General arrangements have been molded by active committees working with Chairman

President and Metal Mining Directors
★ American Mining Congress ★

HOWARD I. YOUNG
President

(Not Shown)
NEIL W. RICE

A. E. BENDELARI

WORTHEN BRADLEY

D. A. CALLAHAN

LOUIS S. CATES

ANDREW FLETCHER

V. P. GEFFINE

W. H. HOOVER

H. C. JACKSON

J. C. KINNEAR

MERRILL E. SHOUP

R. D. Bradford, general manager, Utah Department, American Smelting & Refining Co., and vice-chairman Walter M. Horne, acting manager, Utah Mining Association. News of the forthcoming meeting has been publicized by a committee working with Louis Buchman, general manager, Western Mining Divisions, Kennecott Copper Corp. and E. W. Englemann, assistant general manager, Utah Copper Division, Kennecott Copper Corp. Chairman E. H. Snyder and vice-chairman Otto Herres, respectively, president and vice-president, Combined Metals Reduction Co., head the Exposition Committee and chairman F. A. Wardlaw, Jr., general manager, International Smelting & Refining Co., and vice-chairman James W. Wade, Salt Lake City, will be on hand to head up the Reception Committee that will welcome Convention goers to the meeting.

Chairman Paul H. Hunt, vice-president and

general manager, Park Utah Consolidated Mines Co., and vice-chairman A. G. Mackenzie have arranged a series of post-Convention trips designed to give visitors an excellent picture of mining activities in and near the vicinity of Salt Lake City.

Special events have been arranged for the ladies by an active committee working under the direction of Mrs. O. N. Friendly, chairman and Mrs. L. H. Hart, vice-chairman. These occasions will give mining ladies some fine entertainment as well as a chance to see the scenic beauties of the Salt Lake City region.

Exceptional Exposition

A wide variety of the latest machinery, tools and supplies for all branches of the mining industry will be on display in the 119 different exhibits. Equipment for exploration, rock drilling, blasting, transportation and for each of the specialized operations carried on in the production of ores and nonmetallic minerals will be included in the exposition. Manufacturers' representatives will be on hand to answer questions and confer with operating men to explain the most efficient application of their products. Manufacturers participating in the exposition and a description of their displays are listed in this issue beginning on page 53.

In order that Convention visitors may have ample time to study the exhibits and talk with the technical staffs of the manufacturers, the general and operating sessions have been scheduled to allow a maximum amount of time for this purpose. Lower production costs are the objective of the new developments and equipment shown and mine and mill operating men, as well as company executives, will find the entire show to be the finest and most worth while that has ever been assembled.

The stream-lined system of advance registration which worked so well in Spokane is again being employed. Leading mining companies have sent in lists of their men who will attend and they have been furnished with advance registration cards carrying their names in easily read "box car" letters. On arriving at the Fair Grounds in Salt Lake City, these cards will be turned in to complete the registration and each visitor will be furnished with a regular badge holder. There is no registration fee except for representatives of non-exhibiting manufacturers. All who are interested in mining and its future welfare are welcome.

MBD Meets on Friday

An event of special interest to milling men, the fall meeting of the Minerals Benefication Division of the American Institute of Mining & Metallurgical Engineers, will be held on Friday, September 1, at the Hotel Utah. Technical papers to be presented on this occasion, supplement the two milling sessions of the American Mining Congress Convention to offer a full measure of up-to-date data on metallurgical processes. The program of the one-day meeting of the MBD is shown on page 52.

Fine Entertainment Featured

Exceptional social functions have been scheduled that assure Convention visitors a splendid opportunity to get together with old friends and make new ones. On Monday, a welcoming luncheon will be held in the Coliseum at the State Fair Grounds, at which brief remarks of interest to all will be made. This opening event and all of the Convention social gatherings have been planned for pleasure and relaxation.

Monday evening will feature the famed "Galena Days" celebration, a unique revival of Bingham Canyon's wide-open days of 50 years ago. Special entertainment, dancing and good fun will characterize the evening, following refreshments and a substantial hot supper on the 6190 level of the huge open pit of Kennecott's Utah Copper Division.

Tuesday evening has been left open for visits with friends and for the enjoyment of the city's attractions.

Lagoon, Salt Lake's great amusement park, will be the scene Wednesday evening of a fine annual event, the Mining Jamboree. Liquid refreshments and a juicy steak supper will open an evening of the traditional fellowship and fun of the Mining Congress Convention. The swimming pool and other attractions of this great amusement center will be open and there will be dancing to a top band until early hours.

The annual banquet of the Western Division of the American Mining Congress, feature event of the mining year, will be held Thursday evening. The toastmaster will introduce honored guests briefly and speeches will be entirely absent. Entertainment by top radio and stage artists and dancing will be the key attractions of an evening designed especially for the enjoyment of mining men and their ladies.

(*Continued on page* 50)

SEN. HARRY P. CAIN

HON. GRAHAM BARDEN

HON. CARL T. DURHAM

HON. CLAIR ENGLE

★ ★ ★ PROGRAM ★ ★ ★

Monday, August 28

8:30 a.m. REGISTRATION, Fair Grounds.

10:00 a.m. PRE-SESSION MOTION PICTURE.

10:30 a.m. FIRST GENERAL SESSION—THE STATE OF THE INDUSTRY.

Opening of Convention.

JULIAN D. CONOVER, *Secretary*, American Mining Congress.

Chairman: F. A. WARDLAW, JR., *Gen. Mgr.*, International Smelting & Refining Co.

Outlook for the Nonferrous Metals and for Silver.

SIMON D. STRAUSS, *Vice-Pres.*, American Smelting & Refining Co.

Trend of Metal Production, Wages and Prices.

PAUL H. HUNT, *Vice-Pres. & Gen. Mgr.*, Park Utah Consolidated Mines Co.

Problems of the Small Mine Operators.

HON. CLAIR ENGLE, *Member of Congress from California; Chairman, House Subcommittee on Public Lands.*

Report of Resolutions Committee: General Policy.

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12:00 Noon WELCOMING LUNCHEON, Coliseum, State Fair Grounds.

Presiding: D. D. MOFFAT, Chairman, Western Division, A.M.C., and General Chairman, Arrangements Committees.

Welcome to Utah.

HON. EARL J. GLADE, Mayor of Salt Lake City.

J. REUBEN CLARK, JR., *President*, Church of Jesus Christ of Latter Day Saints.

Responses: HOWARD I. YOUNG, *Pres.*, American Zinc, Lead & Smelting Co.; President, American Mining Congress.

ROY A. HARDY, *Consulting Engr. in Charge*, Getchell Mine, Inc.; National Chairman, Program Committee.

M. L. MCCORMACK, *Mgr.*, Rock Drill Dept., Ingersoll-Rand Co.; Chairman, Manufacturers Division, A.M.C.

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Address: HON. J. BRACKEN LEE, Governor of Utah.

2:00 p.m. PRE-SESSION MOTION PICTURE.

2:30 p.m. SECOND GENERAL SESSION—NATIONAL DEFENSE —MONETARY POLICY—FOREIGN AID.

Chairman: DONALD H. MCLAUGHLIN, *Pres.*, Homestake Mining Co.

Mining's Role in National Preparedness.

Sound Currency for a Sound Economy.

J. W. TAPP, *Vice-Pres.*, Bank of America.

The Future of Gold.

HON. HARRY P. CAIN, *U. S. Senator from Washington.*

Discussion: JOSEPH STAGG LAWRENCE, *Vice-Pres.*, Empire Trust Co.; Consultant, A.M.C. Gold Producers Committee.

The Foreign Aid Program and its Relation to the Mining Industry.

R. L. WILCOX, *Chief*, Nonferrous Metals Branch, Industry Division, Economic Cooperation Administration.

Report of Resolutions Committee: Gold—Monetary Policy.

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2:00 p.m. PRE-SESSION MOTION PICTURE.

2:30 p.m. FIRST OPERATING SESSION—MINE OPERATING PROBLEMS.

"Packaged" Timber Handling.

T. S. VEAZEY, JR., *Asst. Research Engr.*, Anaconda Copper Mining Co.

Diesel Haulage at the Ruth Open Pit.

PAUL HETT, *Gen. Supt. of Mines*, Nevada Mines Division, Kennecott Copper Corp.

Incentive System Increases Tons Mined Per Man Shift.

JOHN G. HALL, *Gen. Supt.*, Chief Consolidated Mining Co.

Hydraulic Hoisting—A Unique Method of Moving Crushed Ore.

PERCY S. GARDNER, JR., Bagdad Mining Co., Philipsburg, Mont.

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5:30 p.m. "GALENA DAYS" CELEBRATION IN BINGHAM CANYON.

Tuesday, August 29

9:30 a.m. PRE-SESSION MOTION PICTURE.

10:00 a.m. THIRD GENERAL SESSION—STRATEGIC METALS—STOCKPILING—TARIFFS.

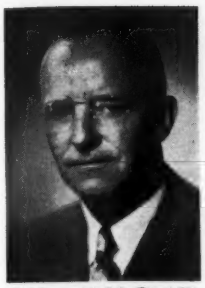
Chairman: J. B. HAFFNER, *Gen. Mgr.*, Bunker Hill & Sullivan Mining & Concentrating Co.

Domestic Supplies of Strategic Minerals.

DAVID D. BAKER, *Consulting Mining & Met. Engr.*, Bishop, Calif.

Progress in Stockpiling for National Security.

CARL ROLLE, *Industrial Engr.*, Office of Materials Resources, Munitions Board.



GOV. J. BRACKEN LEE

C. GIRARD DAVIDSON

SUMNER PIKE

JAMES BOYD

Congress Reviews the Stockpile Program.

HON. CARL T. DURHAM, *Member of Congress from North Carolina;* Chairman, House Armed Services Subcommittee on Stockpiling.

Tariffs Needs of the Mining Industry.

PAUL B. JESSUP, *Vice-Pres.*, Day Mines, Inc.

Report of Resolutions Committee: Tariffs—Stockpiling—Incentives.

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9:30 a.m. PRE-SESSION MOTION PICTURE.

10:00 a.m. SECOND OPERATING SESSION—MILLING METHODS AND EQUIPMENT.

Chairman: E. H. CRABTREE, JR., *Gen. Milling Dir.*, Eagle-Picher Mining & Smelting Co.

Operating Factors in Heavy-Media Separation.

L. J. ERCK, *Chief. Met.*, Cleveland-Cliffs Iron Co.

Discussion: IAN F. CAIRNS, *Asst. to Mgr.*, Fraser and Chalmers, (S. A.), Ltd., Johannesburg, South Africa.

Rod Mill Liners—Panel Discussion.

J. R. CLARKSON, *Mill Supt.*, Bradley Mining Co.
C. E. SCHMIDT, *Mill Foreman*, Homestake Mining Co.
C. F. MILKWICK, *Asst. Supt. of Concentration*, Anaconda Reduction Works.
ROLLIN A. PALLANCH, *Mill Supt.*, U. S. Smelting Refining & Mining Co.
J. F. MYERS, *Mill Supt.*, Tennessee Copper Co.

Application and Performance of the Dual-Impact Breaker.

ANGUS C. ENSIGN, The Galigher Co.

Golden Cycle's Modern Mill.

MAX W. BOWEN, *Vice-Pres. and Gen. Mgr.*, Golden Cycle Corp.

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1:30 p.m. PRE-SESSION MOTION PICTURE.

2:00 p.m. FOURTH GENERAL SESSION—SAFETY—LABOR RELATIONS.

Chairman: HOWARD I. YOUNG, *Pres.*, American Zinc, Lead & Smelting Co.

Safety Progress in Metal Mining.

DAN H. HARRINGTON, *Former* Chief, Health & Safety Branch, U. S. Bureau of Mines.

The Future of Our Labor Law.

HON. GRAHAM A. BARDEN, *Member of Congress from North Carolina;* Chairman, House Committee on Education and Labor.

Labor Relations Today—A Symposium.

A. C. THORNTON, *Industrial Relations Mgr.*, International Minerals & Chemical Corp.
ROY H. GLOVER, *Western Gen. Counsel*, Anaconda Copper Mining Co.
ROY HATCH, *Asst. to Gen. Mgr.*, Kennecott Copper Corp., Utah Copper Div.

Report of Resolutions Committee: Labor Relations.

1:30 p.m. PRE-SESSION MOTION PICTURE.

2:00 p.m. THIRD OPERATING SESSION—EXPLORATION—DEVELOPMENT OF NEW RESERVES.

Chairman: HAROLD A. KRUEGER, *Prod. Mgr.*, St. Louis Smelting & Refining Div., National Lead Co.

White Pine—A Potential Major Copper Producer.

FRANK A. AYER, *Vice-Pres.*, Copper Range Co.

Progress Towards Production at the Blackbird Cobalt Mine.

EDWIN B. DOUGLAS, *Mgr.*, Blackbird Div., Calera Mining Co.

Geochemical Prospecting—A Symposium.

HERBERT E. HAWKES, *Chief*, and LYMAN HUFF, *Geol.*, Geochemical Prospecting Section, U. S. Geological Survey.
GEORGE M. FOWLER, *Consulting Geol.*, Joplin, Mo.
RAY E. GILBERT, *Chief Geol.*, New Park Mining Co.
OWEN KINGMAN, *Geol.*, Tennessee Copper Co.
PETER JORALEMON, *formerly Geol.*, Getchell Mine, Inc.

How Aerial Photography and the Airborne Magnetometer Have Aided Extension of Ore Reserves.

LEON T. ELIEL, *Vice-Pres.*, Fairchild Aerial Surveys, Inc.
HOMER JENSEN, Aero Service Corp.

Wednesday, August 30

9:30 a.m. PRE-SESSION MOTION PICTURE.

10:00 a.m. FIFTH GENERAL SESSION—PUBLIC LANDS.

Chairman: W. H. H. CRANMER, *Pres.*, New Park Mining Co.

Current Proposals for Changes in the Mining Laws—Government and Industry Views.

HON. C. GIRARD DAVIDSON, *Assistant Secretary of the Interior.*

Discussion: DONALD A. CALLAHAN, *Pres.*, Callahan Consolidated Mines, Inc.
CHARLES F. WILLIS, *State Secy.*, Arizona Small Mine Operators Assn.
C. JAY PARKINSON, Attorney, Salt Lake City.

Report of Resolutions Committee: Public Land Policy.

The Phosphate Industry—What It Means to the West.

P. J. SHENON, *Head*, Department of Mining, University of Utah.

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9:30 a.m. PRE-SESSION MOTION PICTURE.

10:00 a.m. FOURTH OPERATING SESSION—PROGRESS IN UNDERGROUND PRODUCTION.

Chairman: C. A. R. LAMBLY, *Gen. Supt.*, Pend Oreille Mines & Metals Co.

(*Continued on page 51*)

AMC METAL SHOW

Manufacturers Division

Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Alloy Steel & Metals Co.
*American Brake Shoe Co.
American Brattice Cloth Corp.
*American Car & Foundry Co.
American Chain & Cable Co.
*American Cyanamid Co.
American Mine Door Co.
Anaconda Wire & Cable Co.
*Atlas Powder Co.

Baker Raulang Co.
Barber-Greene Co.
Bixby-Zimmer Engineering Co.
Bowdil Co.
Broderick & Bascom Rope Co.
*Brown-Fayro Co.
Bucyrus-Erie Co.

Cambridge Machine & Supply Co.
Carboloy Co., Inc.
Card Iron Works Co., C. S.
Cardox Corp.
Caterpillar Tractor Co.
*Central Frog & Switch Co.
Central Mine Equipment Co.
Centrifugal & Mechanical Industries, Inc.
Chicago Pneumatic Tool Co.
Cincinnati Mine Machinery Co.
Cities Service Oil Cos.
Clarkson Mfg. Co.
Colorado Iron Works Co.
Continental Gin Co., Industrial Div.
Crucible Steel Co. of America

D-A Lubricant Co., Inc.
Deister Concentrator Co.
Differential Steel Car Co.
Dow Chemical Co., Great Western Div.
Duff-Norton Mfg. Co.
*Du Pont de Nemours & Co., Inc., E. I.

*Edison, Inc., Thomas A.
Eimco Corp.
Electric Storage Battery Co.
*Elreco Corp.
Ensign Electric & Mfg. Co.
*Enterprise Wheel & Car Corp.
Euclid Road Machinery Co.

Fairmont Machinery Co.
Farmers Engineering & Mfg. Co.
Firestone Tire & Rubber Co.
Flood City Brass & Electric Co.

Gardner-Denver Co.
*General Electric Co.
*Goodman Mfg. Co.
Goodrich Co., B. F.
Goodyear Tire & Rubber Co.
Gorman-Rupp Co.
Gould Storage Battery Corp.
Gruendler Crusher & Pulverizer Co.
Guyan Machinery Co.

Harnischfeger Corp.
Helmick Foundry-Machine Co.
*Hendrick Mfg. Co.
Hendrix Mfg. Co., Inc.
*Hercules Powder Co.
Hewitt-Robins Incorporated
Heyl & Patterson, Inc.
*Hockensmith Corp.
*Holmes & Bros., Inc., Robert
*Hulburt Oil & Grease Co.

Independent Pneumatic Tool Co.
Ingersoll-Rand Co.
International Nickel Co., Inc.
Interstate Equipment Div., Yara Engineering Co.
Irwin Foundry & Mine Car Co.
*I-T-E Circuit Breaker Co.

*Jeffrey Mfg. Co.
Johnson-March Corp.
*Joy Mfg. Co.

Kanawha Mfg. Co.
Kansas City Structural Steel Co.
Kensington Steel Co.
Koehler Mfg. Co.

LaBour Co., Inc.
Lee-Norse Co.
LeRoi Co., Cleveland Division
*Leschen & Sons Rope Co., A.
*Link-Belt Co.
Longyear Co., E. J.
Ludlow-Saylor Wire Co.

* Charter Members.

M. L. McCORMACK
Ingersoll-Rand Co.
Chairman

JOHN T. RYAN, JR.
Mine Safety Appliances Co.
First Vice-Chairman

C. B. STAINBACK
Westinghouse Electric Corp.
Second Vice-Chairman

JOHN P. COURTRIGHT
Marion Power Shovel Co.
Third Vice-Chairman

*McGraw-Hill Publishing Co.
McLanahan & Stone Corp.
*McNally-Pittsburg Mfg. Corp.

Mack-International Motor Truck Corp.
Macwhyte Company
Marion Power Shovel Co.
Mechanization, Inc.
*Mine Safety Appliances Co.
Mine & Smelter Supply Co.
Mining Machine Parts, Inc.
Mosebach Electric & Supply Co.
Mott Core Drilling Co.
*Myers-Whaley Co.

National Electric Coil Co.
National Malleable & Steel Castings Co.
National Mine Service Co.
Nordberg Mfg. Co.

*Ohio Brass Co.
Ohio Oil Co.
Okonite Co., Hazard Insulated Wire Works Div.
Oliver Iron & Steel Corp.
Osmose Wood Preserving Co.
Owens-Corning Fiberglas Corp.

Pacific Foundry Co., Ltd.
Page Engineering Co.
Paris Mfg. Co.
Penn Machine Co.
Pennsylvania Electric Coil Corp.
*Phillips Mine & Mill Supply Co.
Pittsburgh Gear Co.
Post-Glover Electric Co.
Precision Chain Co.
Productive Equipment Corp.
Prox Co., Inc., Frank

Quaker Rubber Corp.

Raybestos-Manhattan, Inc.
Reliance Electric & Engrg. Co.
*Roberts & Schaefer Co.
*Roebling's Sons Co., John A.
Rome Cable Co.

Safety First Supply Co.
Salem Tool Co.
Sauerman Bros., Inc.
Sheffield Steel Corp.
*Simplex Wire & Cable Co.
Simplicity Engineering Co.
*S K F Industries, Inc.
Sprague & Henwood, Inc.
Stearns-Roger Mfg. Co.
Stephens-Adamson Mfg. Co.
Sterling Steel Casting Co.
Sun Oil Co.

Tamping Bag Co.
Templeton, Kenly & Co.
Texas Co.
*Timken Roller Bearing Co.
Tool Steel Gear & Pinion Co.
Traylor Engineering & Mfg. Co.
*Tyler Co., W. S.

Ultra-Violet Products, Inc.
Union Iron Works
Union Wire Rope Corp.
*United Engineers & Constructors, Inc.
U. S. Rubber Co., Wire & Cable Div., and Mech. Goods Div.
*U. S. Steel Corp. Subsidiaries

Vulcan Iron Works Co.

Wedge Wire Corp.
*Weir Kilby Corp.
Western Cartridge Co., Div. of Olin Industries, Inc.
Western Machinery Co.
*Westinghouse Electric Corp.
West Steel Casting Co.
West Virginia Steel & Mfg. Co.
Worthington Pump & Machinery Corp.

(*Continued from page* 45)

All Convention functions are open for the ladies and they are particularly urged to attend the many entertainment features where their presence will add greatly to the enjoyment of these fine events. Also, a number of special parties are being scheduled for the visiting ladies. A tea and reception will be held on Tuesday afternoon at the home of Mrs. C. C. Parsons. On Wednesday morning a delightful "brunch" will be enjoyed on the Hotel Utah roof, and a complimentary organ recital will be attended at the L. D. S. Tabernacle. Various points of interest will be visited on Thursday and the ladies will then proceed to Mill Creek Canyon for a picnic lunch. The route will include a visit to Memorial Grove and a stop at the historic "This is the place" monument.

Post-Convention Trips Planned

The days following the Convention offer visitors an occasion to see points of both scenic and professional interest in the area.

On Friday, September 1, a trip will be made to Provo, Utah, to visit the Geneva plant of U. S. Steel Corp. Travelers will go by bus past the Murray and Midvale smelters to visit this $200,000,000 plant where guides will conduct the group on an extended inspection trip.

At 8:00 am on Saturday, September 2, buses will leave for a trip to the Garfield smelter, the Magna and Arthur mills and the new electrolytic refinery, on the way to visit the great open-pit of Kennecott's Utah Copper Division.

WESTERN DIVISION

THE AMERICAN MINING CONGRESS

D. D. MOFFAT, Chairman
Salt Lake City

●

Board of Governors

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HENRY M. RIVES, Secy.-Treas., Nevada Mine Operators Assn.

MILNOR ROBERTS, Pres., West Coast Mineral Assn.

JOS. H. TAYLOR, Vice-Pres., Peru Mining Co.

FRANCIS A. THOMSON, Pres., Montana School of Mines.

E. McL. TITTMANN, Mgr., Southwestern Dept., American Smelting & Refining Co.

CARL J. TRAUERMAN, Secy.-Treas., Mining Assn. of Montana.

H. E. TREICHLER, Vice-Pres. & Gen. Mgr., Texas Gulf Sulphur Co.

F. C. VAN DEINSE, Vice-Pres. & Gen. Mgr., Yuba Consolidated Gold Fields.

CHARLES F. WILLIS, State Secy., Arizona Small Mine Operators Assn.

S. H. WILLISTON, Vice-Pres., Cordero Mining Co.

RICHARD A. YOUNG, Vice-Pres., American Zinc Co. of Illinois.

W. L. ZEIGLER, Gen. Mgr., Pend Oreille Mines & Metals Co.

PROGRAM

(*Continued from page 47*)

Roof Bolting in Metal Mining.
MILTON C. MCCALL, *Chief*, Accident Prevention & Health Div., Region VII, U. S. Bureau of Mines, Birmingham.

Truck Haulage Power Plants.
C. R. BURTON, *Supt. of Maintenance*, Oliver Iron Mining Co.

Trackless Mechanized Mining in the Lead Belt.
R. T. MURRILL, *Gen. Mine Supt.*, and PETER B. NALLE, *Mine Engr.*, St. Joseph Lead Co.

Applicability of Oil Shale Mining Developments to the Mining Industry.
EMERY M. SIPPRELLE, *Chief*, and HOMER J. BALLINGER, *Mining Engr.*, Oil-Shale Mine Branch, U. S. Bureau of Mines, Rifle, Colo.

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2:00 p.m. PRE-SESSION MOTION PICTURE.

2:30 p.m. SIXTH GENERAL SESSION—ATOMIC ENERGY.

Chairman: BLAIR BURWELL, *Pres.*, Minerals Engineering Co.

The Outlook for Atomic Energy.
SUMNER T. PIKE, *Member*, U. S. Atomic Energy Commission.

Uranium Procurement Policies and Plans.
JESSE C. JOHNSON, *Mgr.*, Raw Materials Operations, U. S. Atomic Energy Commission.

Economics of Domestic Uranium Production.
FRANK H. MACPHERSON, *Mgr.*, Colorado Raw Materials Operations, U. S. Atomic Energy Commission.

Prospecting for Carnotite Deposits.
DORIS H. BLACKMAN, *Geol.*, U. S. Geological Survey.

Processing Uranium Ores.
FRANK W. MCQUISTON, JR., *Met. Adviser on Raw Materials*, U. S. Atomic Energy Commission.

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2:00 p.m. PRE-SESSION MOTION PICTURE.

2:30 p.m. FIFTH OPERATING SESSION—NEW DEVELOPMENTS IN DRILLING AND BLASTING.

Chairman: E. R. BORCHERDT, *Research Engr.*, Anaconda Copper Mining Co.

Problems of Underground Rock Breaking.
J. FRED JOHNSON, *Mgr. of Operations*, Western Mining Dept., American Smelting & Refining Co.

Discussion: J. C. HEASLIP, *Mgr.*, Detachable Bit Div., Canadian Ingersoll-Rand Co., Ltd.

How to Get More Footage Out of Hollow Drill Steel.
ROBERT M. SIMPSON and C. W. DARBY, Crucible Steel Co. of America.

An Over-all Look at Rock Drill Bits.
JAMES D. FORRESTER, *Head*, Mining Dept., Missouri School of Mines & Metallurgy.

Discussion: G. E. AP ROBERTS, Cate Equipment Co.

Progress in Blasting Procedures.
J. M. EHRHORN, *Supt.*, U. S. Section, U. S. and Lark Mine, U. S. Smelting Refining & Mining Co.

Discussion: WING AGNEW, *Chief*, Mt. Weather Station, U. S. Bureau of Mines.

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6:00 p.m. "MINING JAMBOREE" AT LAGOON AMUSEMENT PARK.

Thursday, August 31

9:30 a.m. PRE-SESSION MOTION PICTURE.

10:00 a.m. SEVENTH GENERAL SESSION—TAXATION—PUBLIC RELATIONS.

Co-Chairmen: HENRY B. FERNALD, Loomis, Suffern & Fernald; Chairman, American Mining Congress Tax Committee.
WORTHEN BRADLEY, *Pres.*, Bradley Mining Co.

1950 Revenue Legislation.
WILLIAM I. POWELL, American Mining Congress.

Present-Day Tax Policy and the Mining Industry—A Symposium.
L. J. RANDALL, *Compt.*, Hecla Mining Co.
GRANVILLE S. BORDEN, *Atty.*, San Francisco.
JAMES BOYD, *Dir.*, U. S. Bureau of Mines.

Report of Resolutions Committee: Taxation—Social Security—Governmental Expenditures.

Public Relations and Public Opinion.
CHARLES M. HACKETT, Public Relations Dept., E. I. du Pont de Nemours & Co., Inc.

Public Relations—The Importance of the Stockholder.
JAMES E. HOGLE, *Vice-Pres.*, Rico-Argentine Mining Co.

Who's Right About Silver?
DAVID MOSCONI, *Prof. of Banking and Currency*, Denver University.

Final Report of Resolutions Committee.

•

9:30 a.m. PRE-SESSION MOTION PICTURE.

10:00 a.m. SIXTH OPERATING SESSION—ADVANCES IN MILLING PROCESSES.

Fluo-Solids Roasting of Sulphides.
T. B. COUNSELMAN, *Mgr.*, Fluo-Solids Div., The Dorr Co.

Discussion: STUART R. ZIMMERLEY, *Chief*, and A. E. BACK, Met. Div., U. S. Bureau of Mines, Salt Lake City.

Plans for Treating Greater Butte Project Ores.
F. F. FRICK, *Research Engr.*, Anaconda Copper Mining Co.

Grinding with Centrifuged Media.
A. W. FAHRENWALD, *Director*, School of Mines, University of Idaho.

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2:15 p.m. GROUP CONFERENCES ON SPECIAL PROBLEMS.
(Open to all persons interested.)

Tax Conference.
Chairman: HENRY B. FERNALD, *Chr.* Tax Committee, American Mining Congress.

Gold Producers Conference.
Chairman: DONALD H. MCLAUGHLIN, *Chr.*, Gold Producers Committee, American Mining Congress.

Strategic Minerals Conference.
Chairman: S. H. WILLISTON, *Chr.*, Strategic Minerals Committee, American Mining Congress.

Public Lands Conference.
Co-Chairmen: W. H. H. CRANMER, *Pres.*, New Park Mining Co.
DONALD A. CALLAHAN, *Pres.*, Callahan Consolidated Mines, Inc.

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7:00 p.m. ANNUAL BANQUET. Rainbow Ball Room.
Toastmaster: DONALD A. CALLAHAN, *Pres.*, Callahan Consolidated Mines, Inc.; *Vice-Pres.*, American Mining Congress.

Friday, September 1

NATIONAL MINERALS ADVISORY COUNCIL. HOTEL UTAH.
MINERALS BENEFICIATION DIVISION, AIME. HOTEL UTAH.

AMC METAL SHOW

Members American Mining Congress Staff

JULIAN D. CONOVER
Secretary

A. W. DICKINSON
Legislation

P. D. McMURRER
Assistant to Secretary

HARRY L. MOFFETT
Publicity

WILLIAM I. POWELL
Taxation

SHELDON P. WIMPFEN
Editor
Mining Congress Journal

The U. S. Bureau of Mines is making arrangements with the Denver and Rio Grande Western Railway for special Pullman service to carry those who wish to visit the interesting oil shale mine and demonstration plant at Rifle, Colo. There mining men can see and inspect the methods and equipment used to obtain unusually low rock-breaking costs. The special cars will leave Salt Lake City at 5:30 pm on Friday evening, September 1, arriving at Rifle Saturday morning and leaving Saturday night for Denver or Salt Lake City to arrive there at 8:00 am on Sunday, September 3. Arrangements may be made directly with the U. S. Bureau of Mines at Rifle, Colo.

Even more so than in previous years, the interchange of ideas and information at annual Mining Congress Conventions, together with an Exposition exceeding all others, is a "must" event for all mining men, whether their chief interest is in the field of business policy or in the day-to-day task of keeping the job rolling. Participate in this great meeting to hear able speakers state their views. Contribute your own in the discussion periods to record a real wealth of information of vital importance to the progress of the mining industry.

PROGRAM FOR MINERALS BENEFICIATION DIVISION
AMERICAN INSTITUTE OF MINING AND METALLURGICAL ENGINEERS

Thursday, August 31

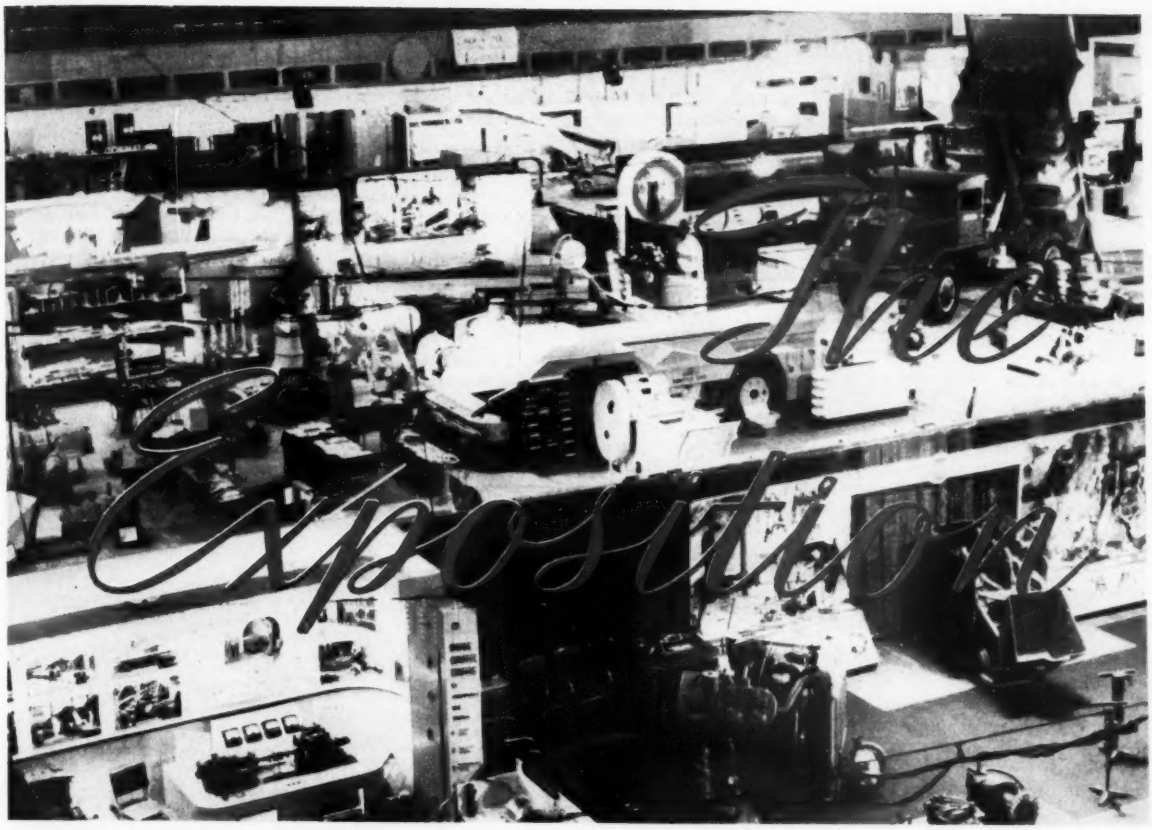
7:00 a.m. SCOTCH BREAKFAST, White Maple Room, Hotel Newhouse.

Friday, September 1

9:00 a.m. Jade Room, Hotel Utah.
Chairman: Fred C. Bond.
Fine Grinding in Pebble Mills at Lake Shore.
B. S. Crocker.
Jaw Crusher Capacities—Blake and Single Toggle Types.
D. H. Gieskieng.
The Center Peripheral Discharge Rod Mills.
D. P. Hale, Jr.
Preliminary Grinding Tests in a Calorimeter.
A. K. Schellinger.

12:15 p.m. MBD LUNCHEON, Empire Room, Hotel Utah.
With Donald H. McLaughlin, president, AIME, and Howard I. Young, president, AMC, as speakers.

2:00 p.m. Jade Room, Hotel Utah.
Chairman: John C. Lokken.
An Investigation of the Amenability of the Low Grade Iron Formation of the Western Gogebic Range to Concentration.
N. M. Levine.
Some Characteristics of Sintering and Testing Iron Ores.
F. H. Hamilton and H. E. Ameen.
An Application of the Dutch State Mines Cyclone for Thickening and Desliming Flotation Feed.
R. I. Kingman.
An Improved Method of Gravity Concentration in the Fine Size Range.
Arvid Thunaes and H. Rush Spedden.



HERE IS a preview of the 123 exhibits that make up the 1950 Exposition in Salt Lake City. Over 37,000 sq ft of space has been assigned for the comprehensive display of machines, tools, equipment and supplies for achieving greater economy, efficiency and safety in the production of minerals and metals. Plan to spend a lot of time in the examination of these exhibits and with the manufacturers representatives who will be on hand for consultation.

• AERO-COUPLING CORP.

Display panels will emphasize those features of the company's low, medium and high pressure flexible hose and quick attachable reusable hose and fittings. A series of photographs will illustrate typical installations using these products because of their ease of installation, resistance to vibration, flexibility and ability to withstand full range of system pressures. *In charge—C. W. Sawhill.*

• ALLIS-CHALMERS MFG. CO.

An operating Hydrocone crusher incorporating the latest design advancements will be featured in the display which will include a Ripl-Flo screen in operation, a 3 by 3-in. rubber-lined pump, and an operating model of a 10 by 8-in. solids pump with automatic Texrope drive. Photographic enlargements making up the background of the display will show a variety of the company's products for the mining industry, including a mine hoist control, service elevator, ball mill, rod mill, switchgear, de-watering pump, Low-Head screen and bracket bearing motor. *In charge—Alex Schlueter.*

• ALLIS-CHALMERS MFG. CO.
Tractor Division

Description not available.

• ALLOY STEEL & METALS CO.

Plans to display the new model "Slushmaster" scraper of lighter weight, greater simplicity and equipped with especially designed blades to allow for quick changing underground. For the first time the "Round-the-Corner" sheave block will be shown, a unit designed to permit hauling scrapers around corners. *In charge—J. M. McKean.*

• AMERICAN AIR FILTER CO., INC.

Dust collectors and air filters will be displayed. Working models of two wet-type dust collectors will be shown along with a type N Roto-Clone which separates dust from the air by means of a water curtain, and the type W Roto-Clone, a dynamic precipitator. The Cycoil oil bath cleaner for filtering engine and compressor intake air will be available for study. *In charge—John Kane.*

• **AMERICAN BRATTICE CLOTH CORP.**

ABC brattice cloth and Mine Vent flexible tubing will be the focal points of the display. Sample rolls of Jute brattice cloth for inspection and flame testing will be available. The Mine Vent tubing will be attached to a blower fan suspended to demonstrate the demountable coupling as well as 90-deg elbows for going around corners. *In charge—D. Blaine Mikesell.*

• **AMERICAN MANGANESE STEEL DIVISION**
American Brake Shoe Co.

A scale model of a renewable lip type dipper will be on display along with maganese steel shell liners, grates and dipper teeth, a hammer mill hammer, track rollers, and sprockets and idlers to show hardfacing applications. *In charge—Gilfry Ward.*

• **AMERICAN WHEELABRATOR & EQUIPMENT CORP.**

An actual size cloth bag type Dustube collector with one wall of plexiglas to permit observation of its construction will be the feature of the display. New developments in filter cloths recommended for handling dusts and fumes at elevated temperatures, as well as filter tubes that have been in actual operation in the mining, smelting, and metallurgical fields will be available for examination. *In charge—R. T. Pring.*

• **ANACONDA WIRE & CABLE CO.**

Description not available.

• **ANDERSON MFG. CO., ALBERT & J. M.**

Pow-R-Gard and Ground-Gard electric power distribution systems make up the display. These combinations of circuit breakers and power outlets in steel or aluminum enclosures are designed for greater economy, safety and efficiency in distributing power to drills, loaders, conveyors or shuttle cars. *In charge—J. B. Luck.*

• **ARMCO DRAINAGE & METAL PRODUCTS, INC.**

A shaft of steel tunnel liner plate, corrugated steel sheeting or lagging, quick-coupling air pipe, corrugated ventilation pipe, culvert pipe and pipe-arches for drain-

age and Flex-Beam Guardrail will comprise the exhibit. The display will be housed in a Steelox building of the type useful for housing mine surface plant facilities. *In charge—Del J. Stoker and Walter H. Spindler.*

• **ATLAS POWDER CO.**

The Rockmaster split-second delay blasting system; Rockmaster electric detonators; a new type of adjustable blasting galvanometer and the new Atlas plastic-insulated wire will comprise the exhibit featuring the latest developments in blasting supplies and equipment for optimum breakage and control with a minimum of explosives. The many safety features of Atlas equipment will be demonstrated in the display. *In charge—R. K. Gottshall.*

• **BARBER-GREENE CO.**

Will feature a series of stereoscopic color slides showing Barber-Greene equipment as applied to the mining industry. A colored mural some 6 ft in length will show a Barber-Greene conveyor at work in the mining field. *In charge—H. W. Newton.*

• **BETHLEHEM PACIFIC COAST STEEL CO.**

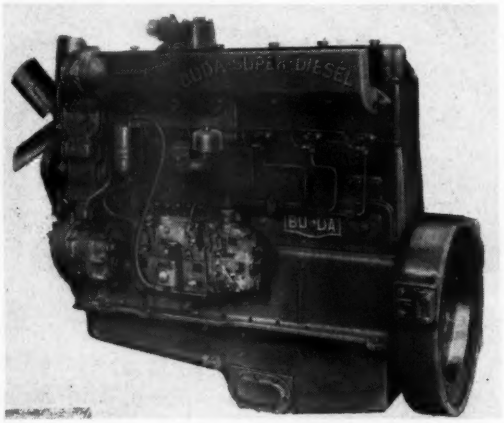
The exhibit will consist of a lighted animated back wall depicting the company's steelmaking operations at its various plants in Seattle, San Francisco and Los Angeles. This will be supplemented with moving slides showing wire rope and drill steel in mining operations, and a display of steel mine ties, hollow drill steel and a wire rope guessing contest. *In charge—W. S. Briscoe.*

• **BUCYRUS-ERIE CO.**

Photographic enlargement of the company's large variety of products will be displayed, including views of the company's shovels, draglines, tractor equipment and blasthole drills. *In charge—Emory M. Heuston.*

• **BUDA CO.**

Will display three new Diesel engines especially designed for haulage and mining equipment. The new 6-DA-844 Dyna-Swirl Diesel engine will be "exploded" to re-



veal the features of the controlled turblence combustion head. Also shown will be the new model 6-DAS-844 and the 8-DAS-1125 supercharged Diesel engines. In addition, a Diesel nozzle tester and lifting jacks will be exhibited. *In charge—H. H. Cohenour.*

• **BUELL ENGINEERING CO., INC.**

Main feature of the exhibit will be a Buell (van Tongeren) cyclone collector built for 300 cfm, and constructed of plastic so the action of the double eddy current is clearly visible. Also included in the display will be the newly developed Buell PMF Hopper Discharge Valve and photographs of the Buell "SF" Swenska Flaktfabriken, a subsidiary of ASEA (Swedish General Electric Co.).

• **BULLARD CO., E. D.**

Several new protective hats will be shown, including permanent molded colors of white, black, red, green, blue, gray and brown in the Fiberglas hard boiled hats. Bullard hard boiled safety hats will also be exhibited in a new aircraft grade aluminum alloy. Other standard safety goods will be Morenci safety belts, first aid kits, protective hoods, goggles and respirators. *In charge—E. W. Bullard and Alpheus Bull.*

• **CARD IRON WORKS CO., C. S.**

A standard 40-cu ft, rocker, dump-type ore car will be on display to represent the complete line of this type of

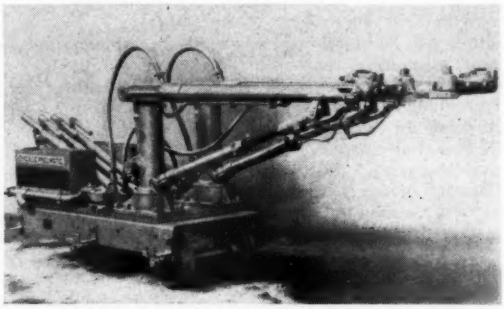
car now available. A standard Z-20 ore car, together with a rail turnout and switch stand plus a table display of rope sheaves and rollers will be included in the exhibit. *In charge—H. B. Patterson.*

• **CATERPILLAR TRACTOR CO.**

Included in the comprehensive showing of the wide variety of equipment made for the mining industry will be track-type and wheel-type tractors; bulldozers and scrapers; and allied equipment such as the Hyster Hystaway and the Trackson Traxcavator. *In charge—W. H. Hogan.*

• **CHICAGO PNEUMATIC TOOL CO.**

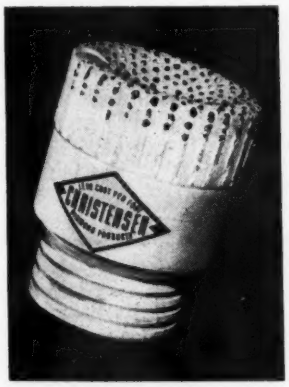
A complete line of sinker drills, demolition tools, drifters, diamond drills, stopers and the CP-8 gas-driven core drill will be included in the display which will feature the new model G-600 drill jumbo. This new rail-mounted twin boom unit has been designed for use in mine head-



ings up to 10 by 12 ft in size and is equipped with dual control valves to permit the operator to control the booms from either side of the arms. Verticle adjustments are controlled by air-operated actuators equipped with automatic safety locks to eliminate any tendency of the boom arms to settle. Pneumatic tools for mine use, equipment maintenance and shaft timbering will also be displayed or their application demonstrated.

• **CHRISTENSEN DIAMOND PRODUCTS CO.**

Various diamond bits, a surface drill, an underground drill, a circulating pump and associated supplies will be exhibited, along with core bits, casing bits, casing shoes, pilot bits and concave bits. Many of the items produced to meet the rigid requirements and variety of uses required by the mining industry will be demonstrated. The display will include a wide variety of core barrels, rods, water swivels, fishing tools, etc., that the company produces for diamond drill contractors and mine operators. *In charge—W. I. Harris.*



• **COLORADO FUEL AND IRON CORP., THE**

Central theme of the exhibit will be grinding media and samples of Cal-wic industrial screen, Wickwire rope and mine roof support bolts. A miniature panel will visually present the advantage of the mine roof support bolts recently introduced. The major presentation will be a carefully designed section of a ball mill in operation providing full visibility so the spectator may see the patterns formed by grinding media and pulp at various speeds. *In charge—Harmon H. Davis.*

• **COLORADO IRON WORKS CO.**

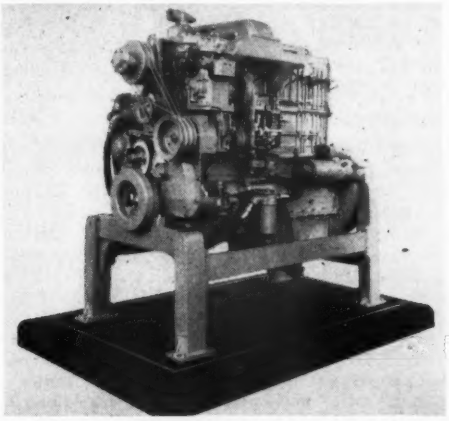
The new Weinig gravity concentrator designed to separate in water medium, two ore constituents having different specific gravities will be the focal point of the exhibit. This unit is expected to bridge the gap between heavy density separation and flotation or other methods of separating fine sizes. *In charge—H. A. Storm.*

• **CRUCIBLE STEEL COMPANY OF AMERICA**

Convention visitors are welcome to visit and relax in a booth arranged for comfort. A guessing contest, with a portable typewriter as the grand prize will be open to all. Among the many drill steel experts present will be G. H. Wilkinson, recently retired from long company service. *In charge—A. E. Perkins.*

• **CUMMINS ENGINE CO., INC.**

Three activated cutaway Cummins Diesels will be featured. These sectionalized models of lightweight, high-speed engines show the internal structure and operation including the Cummins fuel system, the new DD type fuel pump cylinders and liners, valves, pistons, supercharger



and supercharger drive, gear train, water pump, crankshaft, camshaft and the four cycle principle of operation. Internal lighting aids to clearly reveal the engine construction. *In charge—Howard P. Sharp.*

• **DART TRUCK CO.**

Plans to exhibit a show model of the latest in torque converter-transmission units for extra heavy mining trucks and photographic enlargements of Dart trucks in operation for the mining industry. *In charge—C. F. Barber and W. C. Clayton.*

• **DENVER EQUIPMENT CO.**

Will feature a four-cell No. 8 Denver "Sub-A" flotation machine concentrating a lead ore. Included in this small flotation circuit will be a Denver agitator-conditioner, a Denver wet reagent feeder and a Denver sand pump, operating in a closed circuit. *In charge—Henry J. Gisler.*

• **DETROIT DIESEL ENGINE DIVISION, GENERAL MOTORS CORP.**

A glass-enclosed, revolving cutaway of a three-cylinder, two-cycle Diesel engine, and a torque converter model of the new GM 275 hp "6-110" two-cycle engine will be featured. The "6-110" engine, with its fully automatic torque converter power take-off, was announced to the construction and mining fields late in June. *In charge—R. V. Baxley.*

• **DU PONT DE NEMOURS & CO., INC., E. I.**

In addition to a large variety of Du Pont products, the exhibit will feature the use of Du Pont "MS" delay electric

blasting caps in underground mining and recommendations covering equipment and its installation for improving the safety of electric blasting in underground operations. *In charge—R. H. Summer.*

• EDISON, INC., THOMAS A.

The Storage Battery Division will exhibit batteries for both industrial trucks and mine locomotives. A 35-cell C6 nickel-iron-alkaline storage battery, a unit widely used for powering trammer locomotives and a 30-cell C8 battery for industrial trucks, will be featured. Photographic murals will show a mine locomotive and an industrial truck at work. Complementary exhibits will point out several unique features of the Edison Nickel-Iron-Alkaline Storage Battery. A visitor-operated display will enable observation of a positive tube and negative pocket suspended in electrolyte and charged at an extremely high rate. *In charge—R. H. Weeks, Jr., and C. F. Holcomb.*

• EIMCO CORP., THE

All models of underground loading equipment with air and electric motive powered models will be exhibited, including the small 12B rated at 1-ton per minute and the model 40 rated at five tons per minute. The newest type rocker shovel loading equipment will be featured and a full line of Eimco folding scrapers and continuous vacuum filteration equipment will be included in the display. *In charge—D. W. Saunders.*

• ELECTRIC STORAGE BATTERY CO., THE

A guessing contest will be the main event with a U. S. Savings Bond going to the person who guesses closest the number of times a battery can lift itself. Through a unique arrangement, an Exide Ironclad battery will lift itself on the Dynalift until the battery is fully discharged. A giant Ironclad positive plate and a jumbo-size model of a slotted rubber tube will be included in the display along with cutaway versions of industrial batteries of a wide variety of types. *In charge—C. J. Moore.*

• ELRECO CORP., THE

The company's complete line of overhead trolley line material, distribution boxes, trolley taps, suspension hooks and expansion bolts will be exhibited including the type J insulated feeder suspension hook for temporary or permanent lines and the Elreco method of roof bolting. *In charge—F. M. Springer.*

• ENGINEERING AND MINING JOURNAL

Copies of the magazine will be available at a booth designed for the comfort and relaxation of convention visitors. *In charge—R. W. Davis and Wm. H. H. Ginder, Jr.*

• EUCLID ROAD MACHINERY CO., THE

A new ten-ton model UD rear-dump Euclid will be the highpoint of the display which will include job photographs of other Euclid equipment prominent in the mining field. *In charge—A. S. McClimon.*

• FLEXIBLE STEEL LACING CO.

Will display several large and small samples of belt fasteners appropriately applied to conveyor belting together with samples of the necessary tools for application. Background material will include additional belting, fasteners and equipment. *In charge—Hugh J. Beach.*

• GALIGHER CO.

Agitair flotation machines, Geary-Jennings samplers, ore dressing equipment and laboratory units used in conjunction with ore testing will be featured. Also on exhibit will be rubber-lined and rubber-covered equipment showing the results of their application in conjunction with abrasive and acid conditions. Units on display will be of actual commercial size and will operate continuously during the show hours. *In charge—J. F. Woodhead.*

• GARDNER-DENVER CO.

Plans to exhibit a wide variety of its extensive line of mining machinery including two stopers, two pneumatic columns, five sinker drills, three drifting drills, the air leg feed and hydraulic drill jumbo equipped with three different drills, four paving breakers, four hoists, three airslushers, and additional accessory equipment for the mining industry. The effect of "Satinizing" rock drill parts will be demonstrated. A number of units included in the exhibit have only recently been introduced. *In charge—F. B. Matheson.*

• GATES RUBBER CO., THE

Rubber-faced plate and rubber covering with the rubbed bonded to metal to increase the resistance to abrasion and corresion will be featured in the exhibt which will include V-belt drives and rubber hose. *In charge—J. E. (Joy) Chiles.*

• GENERAL ELECTRIC CO.

Visitors will be able to operate a 1½-ton storage battery trammer locomotive, feature attraction of the display. An operating, transparent plastic 10-hp, Tri-Clad pump motor will be included in the exhibit. This unit is equipped with a time delay switch and the new design magnetic starter. A G-E two-shoe magnetic-d-c brake of the type commonly used on cranes and hoists will be exhibited along with a G-E flotation motor, a high-voltage air-break contactor and an operating exhibit of motor-generator battery charging sets. Mine lighting equipment and the many different types of cable manufactured by G-E will round out the exhibit.

• GOODMAN MANUFACTURING CO.

Mancha Storage Battery Locomotive Division

Will feature the Mancha-Little Trammer. A new Mancha attachment which adds to the operating safety of this widely known haulage locomotive will be demonstrated. *In charge—J. D. James.*

• GOULD STORAGE BATTERY CORP.

A new "Z" plate line of batteries for mine haulage will make up the display. Using new casting techniques, a grid has been produced that is solid all the way through, to greatly reduce grid deterioration in operation. *In charge—J. A. Gilruth.*

• HARDINGE CO., INC.

A movie of the new Tricone mill in operation at Tennessee Copper Co. will be key feature of the display which will include a background of lighted color transparancies and a film showing Tricone mill fabrication and operation. Another film showing operation of the Hardinge countercurrent Heavy-Media separators on the Mesabi iron range may also be shown. *In charge—G. A. Wallerstedt.*

• HARNISCHFEGER CORP.

A working model of the Magnetorque electric clutch drive, which is standard on all P&H electric shovels, will be on display along with a model of the Magnetorque electric clutch used on all large size Diesel shovels. In the hoist field there will be several electric P&H units, with capacities from 250 lb to 15 tons. A show model of a three cylinder P&H Diesel engine will be an added attraction. *In charge—P. H. Hunter.*

• HERCULES MOTORS CORP.

Will exhibit models of its complete line of gasoline and Diesel engines. Of the 16 units on display, the Diesel model DNXV-8D will be of particular interest for its compact design and rugged characteristics designed specifically to meet the operating demands of mining operations. *In charge—Wm. P. Humphrey.*

• **HERCULES POWDER CO.**

Detonators for use in the mining industry and Yarmor F Pine Oil for flotation will be shown in addition to the standard Hercomite and Gelamite cartridges and the new 23 GTimesaver cartridge. Electric blasting caps, short period delays, and No-Vent all metal delays will also be displayed. *In charge—George B. Bossert.*

• **HEWITT-ROBINS, INC.**

Will have in operation a heavy duty scalper able to scalp off huge rock lumps weighing 9000 lb and more at the rate of 1100 tons or more per hour. Although the unit itself weighs less than six tons, no impact of vibration or load passes through the vibrator or is perceptible in the base frame. Also, an ore-type mine conveyor in operation will be shown along with hose and belting products of the company's Hewitt Rubber Division as well as idlers and screen cloth of the Robins Conveyors Division. *In charge—R. U. Jackson.*

• **HUMPHREYS INVESTMENT CO., THE**

A full size Humphreys Spiral Concentrator operating as a closed circuit test unit on minus 10 mesh feed will be shown in such a manner that the products can readily be observed and inspected. *In charge—Whitman E. Brown and James V. Thompson.*

• **HYDRAULIC PRODUCTS INC.**

Description not available.

• **INDEPENDENT PNEUMATIC TOOL CO.**

Four completely new Thor pneumatic mine tools, along with the company's full line of drilling equipment will be exhibited. The new Thor power feed unit for drifter rock drills, with lightweight aluminum shells in three lengths up to 96-in. feeding capacity, and featuring extra sensitive control designed to eliminate carbide bit and drill steel breakage, will be the newest development to be displayed. A Thor reverse feed unit for stoper rock drills, Thor stoper legs for converting sinker type drills into stopers and a new, lightweight Thor 35-lb class sinker rock drill will be available for inspection. *In charge—John F. Corkery.*

• **INGERSOLL-RAND CO.**

A large variety of products that the company builds for the metal mining industry will be emphasized in the exhibit that will include new rock drills, new Carset bits, new and lighter drill mountings, and the improved JL-4 Jackleg for mounting Jackhammers. A new type XLE, two-stage, package type stationary compressor will be on display to substantiate the theme "From Power Plant to Bottom of the Drill Hole, Use I-R Matched Products." *In Charge—L. H. Geyer.*

• **INTERNATIONAL HARVESTER CO.**

A cutaway International UD-24 Diesel engine will be on display and the 180-hp unit will be complete with radiators, fan and clutch. A 190-hp engine, largest Diesel made by the company, will be shown as a stripped unit. Action photographs will form a background for the display. *In charge—P. D. Evans.*

• **JEFFREY MANUFACTURING CO., THE**

An extensive display of equipment that the company manufactures for the mining industry will include two MV mechanical vibrating conveyors set up for continuous operation with a No. 4 electric vibrating pan feeder. An impact type rock crusher will be shown and an electric vibrating barrel packer will be demonstrated in operation. The exhibit will also include an A-6 post drill, a type 12-A Aerodyne mine fan, a four ft Aerodyne Junior mine fan, a universal blower, an Aerodyne midget blower and an eight-ft section of underground belt conveyor. *In charge —J. H. Fulford.*

• **JONES & LAUGHLIN STEEL CORP.**

Description not available.

• **JOY MANUFACTURING CO.**

New developments in machinery for mechanized mining will be exhibited featuring the Joy 17-HR continuous-type loader, the Joy drillmobile, the S-91 stoper with telescopic

feed leg, and two new portable air hoists. The drillmobile, a self-propelled and rubber tired drilling unit employs long-feed drills mounted on Joy Hydro Drill jibs. Included in the exhibt will be Joy's complete line of "Silver Streak" rock drills, slushers, portable hoists, core drills, fans and blowers, air compressors, rock bits, core bits, electrical connectors and scraper buckets.

• **KEENEY CO., PAUL E.**

Description not available.

• **KENNAMETAL INC.**

Will display rotary auger bits, together with accessories for blast hole drilling and roof bolting. Two types of rock bits will be shown, the single blade chisel type bit for uniformly hard ground and a new three point bit for average ground. Also included is a display of Kennametal tools for metal working. *In charge—Richard Farris.*

• **LE ROI CO., CLEVELAND ROCK DRILL DIVISION**

The Cleveland Division of the company, manufacturers of the Cleveland rock drills, will show its full line of machinery including the air powered MDR mine jumbo equipped with 3½-in. diam PD25, power-feed drifter. The new two to one patented light wagon drill will be shown plus a complete line of rock drills, drifters, stopers and reverse air feed sinker drills mounted on air columns. *In charge—R. R. Morgan.*

• **LESCHEN & SONS ROPE CO., A.**

Samples of "Hercules" red-strand wire rope in the wide variety of types used by the mining industry will be available for inspection. A display of wire rope slings for material handling will include the "Hercules" flat-laced slings. *In charge—H. L. Waltman.*

• **LIMA-HAMILTON CORP.**

Lima Shovel and Crane Division

A background display will include photographs of Lima shovels, cranes and draglines in use by the metal mining industry. These photographs, in natural color, will provide pictorial interest for visitors to the comfortable booth. *In charge—Roy Wills.*

• **LINDE AIR PRODUCTS CO., THE**

Flame-gouging, a process tailor-made for mine repair, will be featured in the exhibit. This method designed expressly for mine maintenance, requires only a special nozzle to convert a standard Oxweld C-32 cutting blow-

pipe for use in flame-gouging operations. Jet-piercing equipment will be shown including the FSJ-1 plow pipe and a quartzite boulder, that has been pierced by this manual unit. *In charge—O. H. Davenport.*

• LINK-BELT CO.

Link-Belt conveyor and processing equipment, theme of the exhibit, will be carried out in a backwall display of large photographs of recent outstanding installations in the metal mining industry. An operating Link-Belt "CA" concentric action vibrating screen of the suspended type; an arrangement of belt conveyor troughing idlers—standard, rubber-tread impact and belt training, and steel roll and rubber tread return; a Link-Belt herringbone gear drive with the upper portion of the housing of plastic to show the internal mechanism driven through the medium of a Link-Belt electrofluid drive, will be exhibited on the floor. Ball and roller bearing pillow blocks and other Link-Belt power transmission units including chains will be displayed. *In charge—L. O. Millard and A. H. Boike.*

• LINK-BELT SPEEDER CORP.

A full operating 1-in. scale model of a Link-Belt Speeder K-375 shovelcrane will be working under simulated conditions to strip overburden with a dragline attachment and dig and load ore with a shovel. This scale model will perform all the tasks of a full size unit as it goes through its paces before a background display of transparencies and color enlargements of Link-Belt Speeder shovel-cranes on various jobs. *In charge—L. O. Millard and A. H. Boike.*

• LUDLOW-SAYLOR WIRE CO., THE

A wide variety of actual samples of Super-Loy woven wire screens and wire cloth specially engineered to withstand abrasion, endure vibration and resist fatigue will be shown along with samples of special hook-strip edgings for applying wire cloths to tensioned vibrator screens. Visitors will have an opportunity to examine the variety of metals and alloys in which wire cloths and screens can be supplied. *In charge—R. R. Peterson.*

• MACK MFG. CORP.

Will exhibit a giant Mack Model LRSW, 30-ton, six-wheel, off-highway dump truck. Powered by a Cummins NHRBS, 300-hp Diesel engine, this vehicle also incorporates a Schneider torque converter. Mack's balanced bogie and power divider will be shown in addition to its Model TRDX-510, eight-speed, duplex transmission. *In charge—Pierce J. Fleming and John Walker.*

• MARION POWER SHOVEL CO.

A scale model of a Marion type 7400 walking dragline will be displayed. This working miniature dragline is a replica of the unit which handles buckets ranging in size from 8 to 12 cu yd on a boom length ranging up to 200 ft. The scale model may be put through its operating paces by means of a control board located near the machine. The model can hoist, swing, and drag its bucket, precisely in the same fashion which large walking draglines employ in uncovering deep layers of overburden. *In charge—John P. Courtright.*

• MINE SAFETY APPLIANCES CO.

Will display a large variety of the many items produced for improving safety in the mining industry. The Edison R-4 electric cap lamp will be featured along with the MSA Maskfone, the MSA chenox oxygen breathing apparatus, velocity power tools and the famous Skullgard safety hats, also a complete line of respirators, first aid equipment, gas masks and oxygen breathing equipment. *In charge—D. F. McElhattan.*

• MINE & SMELTER SUPPLY CO., THE

High point of the exhibit will be the Massco Circuitron, an automatic grinding circuit control designed to maintain any feedings circuit at its optimum point by controlling the rate of new feed to the grinding mill, regulating the classifier sand load and maintaining a constant density of the classifier overflow. *In charge—C. G. Willard.*

• MINING CONGRESS JOURNAL

Will welcome convention visitors to relax in comfortable surroundings. Copies of the magazine will be available.

• MINING ENGINEERING

Representatives of the publication, official magazine of the American Institute of Mining & Metallurgical Engineers, will be on hand to welcome convention visitors. *In charge—John Beall.*

• MINING WORLD

Will display samples of field work done by its personnel in the course of travel throughout the mining areas of the United States. World Mining will feature similar work done in the international field. *In charge—Max Holsinger.*

• MORRIS MACHINE WORKS

Type R slurry pumps of a design that takes suction from the drive side only, will be on display. These pumps for handling concentrates, tailings, slag and filter and classifier residues will be assembled and disassembled to illustrate simplicity of construction. *In charge—W. H. Pfarrer.*

• MORSE BROS. MACHINERY CO.

Representatives of the company will be on hand to welcome Convention visitors to a booth designed for their comfort and relaxation. *In charge—H. N. Grimes.*

• MOSEBACH ELECTRIC & SUPPLY CO.

The new Mesco shock absorber, the hydraulic brake adjuster and clamp-type trolley taps will be on exhibit together with a heavy-duty feeder switch. *In charge—John C. Loy, L. C. Burry, and N. F. Wetzel.*

• NATIONAL ELECTRIC COIL CO.

National windings will be accented in the exhibit which will show their application for both alternating and direct current in motors and generators. Electrical insulating materials of all types will be available for inspection. *In charge—Wendell Hatfield.*

• NATIONAL MALLEABLE AND STEEL CASTINGS CO.

Willison automatic couplers will be featured in the display along with the national NC-1 truck for mine and industrial equipment and national rubber cushioned draft gears. Swivel hitching, plain link hitching, and Naco cast steel wheels, cast steel sintering pallets, Mallix sintering bars and ore-grinding balls will be included in the exhibit. *In charge—Herb H. Smith.*

• NORDBERG MANUFACTURING CO.

Photomurals picturing installations of Nordberg machinery for processing ores and minerals together with a working model of a Symons cone crusher will be exhibited. Facilities of the booth are designed primarily to give guests a place where they may relax and discuss operating problems with company representatives. *In charge—Harold N. Propp.*

• OHIO BRASS CO.

In addition to the new and popular O-B roof support expansion shell and plug, the exhibit will include representative safety and control materials, trolley fittings, rail bonds and collection equipment. The O-B type-N distribution box will be displayed along with a type-T smooth underrun section insulator switch for sectionalizing trolley

or both trolley and feeder with one unit. *In charge—J. H. Sanford.*

• **OIL PRODUCTS CO. OF UTAH**

Description not available.

• **OSGOOD CO., THE, and GENERAL EXCAVATOR CO., THE**

Photographic enlargement of power shovels, cranes, draglines, clamshells, hose and pile drivers produced for use by the mining industry will form a background for the booth designed for the convenience of convention visitors. *In charge—Frank L. Johnson.*

• **OSMOSE WOOD PRESERVING CO.**

Samples of Osmose timber preservatives used by the mining industry and specimens of Osmose-treated mine timbers after many years of service will be available for inspection. Photographs and technical files will be available on all phases of mine roof support. A feature of the display will be an Osmose wooden mine roof plug. *In charge—Dan Kamphausen.*

• **PIONEER ENGINEERING WORKS**

Heavy duty feeders, crushers, screens and conveyors for the mining industry will be featured. Cutaway models will demonstrate mode of construction and enlarged and illuminated photographs will portray various equipment applications. Operating models will demonstrate the jaw crusher, roll crusher and manganese steel apron feeder. *In charge—Nick Savage and C. T. Hendrickson.*

• **PITTSBURGH GEAR CO. and OTTUMWA IRON WORKS**

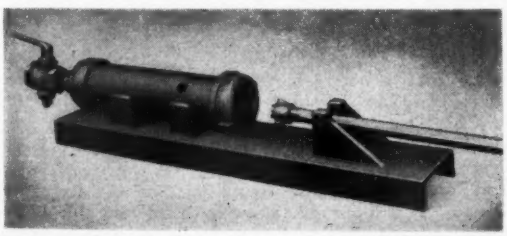
A Sykes continuous tooth herringbone gear, speed reducer equipment with herringbone gears, pinions, shafts and sprockets for mining machinery and the Pittsburgh armored guaranteed gear will be displayed. This latter unit will be cut open to show construction as well as the taper serrated armature shaft and pinion that eliminates keyways. A mine hoist manufactured by Ottumwa Iron Works will be included in the exhibit. *In charge—E. R. (Eddie) Phillips.*

• **RAYBESTOS-MANHATTAN, INC., MANHATTAN RUBBER DIVISION**

Conveyor belts to be featured are the Homocord, the Ray-Man, the Whipwire, and the Condor Compensated Transmission belt. Condor Homoflex hose, heavy duty Homoflex Air and Water Hose, and Buronik Trolley Wire Guard will also be available for inspection. *In charge—A. L. Hawk.*

• **ROCK BIT SALES AND SERVICE CO.**

Plans a display of the crowned carbide Rok-Bits, intraset steel and carbide drills produced by the company. New products to be introduced on this occasion will be the



hole-saver to retrieve broken steel and lost bits, knock-off blocks for removing one use bits from steel and a gauge for checking angles when regrinding carbide bits. *In charge—John Neamand.*

• **ROEBLING'S SONS CO., JOHN A.**

Electric wire and cable will be displayed including portable power and mining machine cables, bare copper, trolley contact and magnet wire. Wire rope for mining applications also will be shown, as well as sizing and vibrator screens and metallic filter cloth. *In charge—Eugene M. Urban.*

• **RUTH CO., THE**

No description available.

• **SANDVIK STEEL, INC.**

Will display the new Coromant tungsten carbide rock drill steel and the Atlas Diesel rock drilling machine. Feature of the display will be an actual demonstration of the use of this equipment in drilling a granite block. *In charge—Tore Mortsell.*

• **SHEFFIELD STEEL CORP.**

The theme of the display will be "Sheffield Moly-Cop Grinding Balls—Used and Proved Around the World." To dramatize this theme an animated display consisting of a revolving globe will show continents and countries in relief. An endless stream of Sheffield grinding balls will pass around the globe and pennants will identify the 37 countries using Sheffield Balls. *In charge—George P. Lacy.*

• **SIMPLICITY ENGINEERING CO.**

Will exhibit one of its largest type horizontal 4 by 14-ft two-deck screens, a unit particularly adaptable for dewatering sludge and fine sizing of ores and coal. *In charge—R C. Johnson.*

• **SOCONY-VACUUM OIL CO., INC.**

Description not available.

• **SOUTHWESTERN ENGINEERING CO.**

Sweco's HMS plant and the Sweco Separator will be featured in the exhibit. The HMS unit, available in a

wide capacity range, produces a middling product. The Sweco vibrating screen will be available for examination while operating. *In charge—Jack Lowe.*

• **STEARNS-ROGER MANUFACTURING CO.**

The application of Meehanite metal to machinery and equipment used in the mining industry will be the theme of the exhibit. Castings and equipment displayed will cover wear-resistant Meehanite, and heat resistant and general engineering Meehanite metals. *In charge—D. L. Clow.*

• **TALCOTT, INC., W. O. & M. W.**

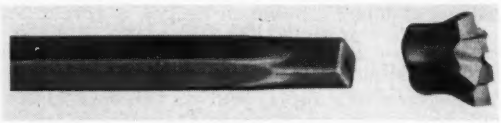
Will feature the Acme patch fastener, a unit for performing emergency repairs to all types of belting. The Talcott conveyor and clinching belt fasteners for all types and sizes of that rubber transmission and conveyor belting will also be exhibited. *In charge—G. W. Little.*

• **TAMPING BAG CO., THE**

Seal-type Tamping Bags made from wet strength paper will be exhibited. A weed and brush killer especially useful for controlling plant growth on right-of-way's, around buildings, and in mine yards will be shown along with a number of other products handled by the firm. *In charge—Alfred E. Pickard.*

• **TIMKEN ROLLER BEARING CO., THE**

Will display many of its products including the multi-use bit and the carbide insert bit with the new Timken



removable rock bits featured as the item of primary interest. *In charge—W. G. Turner.*

• **TOOL STEEL GEAR AND PINION CO., THE**

A special panel board will show cross-sectional pieces of the various types of hardened steel products manufactured for the mining industry. Included in this exhibit will be pieces of gears, sprockets, sheave wheels, track wheels and many other steel pieces. Etching of the hardened surfaces will reveal those portions of the pieces that actually come in contact with others. *In charge—John C. Seeger.*

• **TRABON ENGINEERING CORP.**

Will exhibit their complete line of manual and automatic oil and grease lubrication systems placing special emphasis on small, fully automatic systems for crushers, shaker screens and other equipment operating continuously under wet and dirty conditions. A variety of pumps will be shown in operation and a transparent plastic type "MX" measuring valve will be operated by the discharge of lubricant from an MP pump. *In charge—Wilbur Deutsch.*

• **TRAYLOR ENGINEERING & MFG. CO.**

Will feature photographic enlargements of feeders, crushers, crushing rolls and smelting machinery made by the company. Traylor equipment in use will be shown by means of a projector. *In charge—C. Hayward Roberts.*

• **TYLER CO., THE W. S.**

An operating Ty-rock screen will be the key point of interest in the display which will comprise samples of woven wire screens of many different metals and meshes, along with a Ro-Tap testing sieve shaker and Tyler standard screen scale testing sieves. *In charge—E. M. Graham.*

• **ULTRA-VIOLET PRODUCTS, INC.**

Fluorescent mineral specimens will be displayed under the illumination of a Mineralight. Long wave ultra-violet units as well as short wave units will be shown and the application of Geiger counters for checking and testing uranium ore samples will be demonstrated. *In charge—Thomas S. Warren.*

• **UNITED STATES STEEL CORP. OF DELAWARE**

A large variety of the company's products built specifically for the mining industry will be included in the comprehensive exhibit. Mine rails and ties, mine timbers, trolley wire and power cables, rail bonds, wire rope and tramways, underground water lines, Cor-ten and abrasion-resisting steels, screens, Cyclone conveyor belts and property protection fence will be included—in the wide variety of products exhibited.

• **VICTAULIC COMPANY OF AMERICA**

Will show its world-known line of Victaulic pipe couplings, sizes ¾ in. through 60 in. in diameter, its modern full-flow elbows, tees, reducers and accessories for compressed air, water-supply, drainage, and mill pipe systems and its handy Vic-Groover portable pipe tools. Units operating under air and water pressure will visually demonstrate Victaulic's slogan . . . "The Easiest Way to Make Pipe Ends Meet." *In charge—R. W. English.*

• **WELLS, INC., MARTIN**

Valve seats for industrial engines of all sizes and types and the Master rod saver electrode holder together with other designs of electrode holders will be available for inspection. *In charge—Martin Wells.*

• **WESTERN CARTRIDGE CO.**
(Division of Olin Industries, Inc.)

Blasting caps of all kinds manufactured by the company and dynamites produced by Columbia Powder Co. and Equitable Powder Co. will be available for inspection. A centrally located turntable mounting five display units and featuring the various products made by Olin divisions, subsidiaries and affiliates will be the central point of the display. *In charge—A. J. Barocca.*

• **WESTERN MACHINERY CO.**

A Wemco SH classifier of commercial size will be arranged in operating position and wired so visitors may operate the triple-pitch spiral and hydraulic lifting device. Also, a commercial size Fagergren flotation machine with special cutaway mechanism, a Fagergren laboratory flotation cell in operation, a Heavy Media separation unit in operation and a Wemco centrifugal sand pump will be on display. *In charge—R. W. Hernlund.*

• **WESTERN ROCK BIT MFG. CO.**
CALUMET & HECLA CONSOLIDATED COPPER CO.

All types of the Liddicoat bit will be available for inspection and demonstrations will show the means of attachment and detachment. Graphs and charts together with case history studies will reveal results being attained. *In charge—M. W. Hawksworth and G. W. Craig.*

• **WESTINGHOUSE ELECTRIC CORP.**

Will exhibit its new Life-Line motors and a cutaway motor and a splashproof unit operating under a stream of water will be shown. New Life-Linestarters, a new type control center, metal rectifiers, line material, indicating and recording instruments, industrial lighting units, and speed reducers will be included in the display. A special feature will be a graphic presentation of the application of type AB De-ion circuit breakers to open-pit and underground power distribution systems. *In charge—J. R. Fulton and R. N. Anderson.*

• **WILLSON PRODUCTS, INC.**

Will display a complete line of eye and respiratory protective devices for the safety and comfort of the individual worker. *In charge—S. C. Herbine.*

• **WORTHINGTON PUMP & MACHINERY CORP.**

A complete line of Blue Brute drifters and stopers will be featured plus hand-held rock drills and air tools, a UMW-40 wagon drill and representative models of Blue Brute portable self-priming centrifugal pumps. Multi-V drives, a Unabloc vertical air compressor and a Monobloc pump will also be displayed. A photographic display will show the corporation's air conditioning and refrigeration equipment and a large variety of its other products including steam turbines, electric motors, Diesel engines, and stationary compressors. *In charge—P. H. Nast.*

Northern Iron Ore

(*Continued from page* 37)

Seven Islands northward, actually from about mile 30 to mile 100, comprise the stretch of heavy grades. Here the line rises to the height of land near Lake Coapacho, along the valleys of the Moisie, Nipissis and Wacouna Rivers. The greatest elevation on the right of way, maintained substantially thereafter to Burnt Creek, is 1900 ft.

Rock work can proceed throughout the year, earth moving about 7½ months. After the first 100 miles from Seven Islands, cuts and fills average 28,000 cu yd per mile. Roadbed construction is estimated at two to three miles daily north of the height of land. The Q. N. S. & L. will traverse the shores of Lakes Ashuanipi and Menihek, each from 60-75 miles long, along which men and supplies may be ferried as work progresses. With the roadbed completed, the Hollinger management expects all ties and rails to be laid in one long season. To gain time, the 360-mile job will be divided between seven or eight contractors, with the concessionaires building specimen stretches to check performance. Much of the food and lighter supplies will continue to come in by air, while ties and heavier equipment move over a "tote" road ahead of construction. This road has advanced about 70 miles north from Seven Islands. Southward from Burnt Creek the road can be built by bulldozer as rapidly as desired.

Modern Railway Will Haul Ore

Canadian corporations are customarily recipients of Provincial charters, as in the United States. The Quebec North Shore & Laborador Railway was incorporated by special act of the Dominion Parliament in 1948, indicative of national realization of the importance of Ungava iron to Canada's economic future. While the road is building over three seasons, orders will be let for heavy duty rolling stock and equipment. Included are Diesel-electric locomotives (even maintenance-of-way trains will be Diesel-powered) for terminal switching and 8000 hp freight hogs. The 2500 ore cars will load 100 tons apiece.

Ten thousand tons of iron ore will leave Burnt Creek daily, aboard seven to eight trains made up of 100 to 104 cars similar to those used by Utah Copper Co. Maximum speed is set at 45 mph, normal running time for the 360 miles at 13 hours. Ore dug by power shovels in the heart of Labrador, delivered by belt conveyors to the waiting trains, can settle in the holds of ocean-going vessels within the same day. Committees of traffic experts lent by the Canadian National and Pennsylvania Railroads have estimated the rail transportation cost at approximately ½¢ per ton-mile, including amortization on the investment. Although final figures are not public, it is reported that the over-all cost of ore stockpiled at Seven Islands will appreciably undercut Mesabi prices at Duluth and render Ungava a confident contender for the American market.

Five shovels, of 6½ cu yd capacity, will dig 70,000 tons daily, 10,000,000 tons per mining season. This may be stepped up to double that amount, the management states, by the addition of more shovels and cars, and the port is designed to handle 20,000,000 tons annually. Over-all cost of the Ungava development, excluding shipping, is estimated at $170,000,000 to $200,000,000.

Labor Supply Must Be Established

Ingenious solutions have been found to the seasonal labor problem. Although the Ungava climate is less rigorous than in the regions of northern Ontario, Yellowknife and Alaska where mining continues throughout the year, consideration that frozen iron ore is difficult cargo will limit mining operations to a season of six to seven months. The port of Seven Islands is naturally ice-free nine to ten months per year (longer than the Great Lakes shipping season) and the light tide-driven pack ice that accumulates in the harbor during January to March is easily cut by ice-breakers. Men laid off for the winter find ready employment cutting pulpwood in nearby regions of Quebec. Q. N. S. & L. railway crews will alternate with the Canadian railways, whose busiest season comes in winter, after St. Lawrence River traffic ceases.

Housekeeping for such a project is a major task in itself. In 1949 about 1000 tons of supplies for the 200-man prospecting and mapping crew were flown in by Hollinger Ungava Transport. This enterprise maintains weather stations, and airstrips with beam control at Mont Joli, Seven Islands and Burnt Creek. Seaplanes operate from Seven Islands and Knob Lake, adjoining Burnt Creek. Two DC-3s and nearly a dozen smaller planes, including helicopters for mapping, serve the development. Flights continue the year round; maintenance crews are supplied and stores built for the rush summer season during the cold but relatively calm Ungava winters. Temperatures occasionally drop to 50 below for short periods, paralleling the readings in the oil fields of northern Alberta.

A town will be built at Knob Lake as soon as the railway is under way. It is designed to house about a thousand employes, including 700 miners, 100 men stripping overburden and prospecting, plus several hundred engaged in maintenance and office work. Adjoining the port site at Seven Islands, housing and office buildings will provide for operation and personnel. The site chosen is on the northeasterly side of Seven Islands Bay, where harbor depths of 40 ft permit the docking of large ore carriers.

The man responsible for bringing Ungava ore to the market, overseeing the venture from prospecting to final operation, is a tall, calm Canadian engineer, W. H. Durrell, general manager of Labrador Mining & Exploration, who built the Goose Bay, Labrador, airport as a major staging station during World War II. With J. A. Little as field manager and Dr. Retty as chief geologist, Hollinger-Hanna possess management inspiring confidence in the success of the Ungava venture.

National Film Board.

An endless labyrinth of lakes covers central Labrador

Neutralizing Acid Mine Water

Present Trends in the Control of Water-Borne Industrial Wastes

By HENRY F. HEBLEY
Research Consultant
Pittsburgh Consolidation Coal Co.

SPECIAL emphasis has been placed in this report, on the problem of coal mine acid drainage water and some of the facts that have been discovered through recent research. These are most important as they indicate that many of the theories and practices that have received wide acceptance to date are actually in error. Some of the costly construction that has been carried out in the field has been based on these earlier theories and it is questionable whether or not the expected beneficial results are being realized.

Water-borne wastes may be conveniently divided into those of domestic origin (sewage) and those discharged by industry. Again the pollution may be classified as organic or inorganic wastes, and frequently there are interactions between the various pollutants that create serious problems. The science and art of sewage treatment is well understood; its dominant characteristic is the nitrogenous content, which leads to its putrescibility.

In contrast, industrial wastes may run the gamut of the extremes known to organic and inorganic chemists. If treatments based on sanitary sewage procedures are employed in the methods used for industrial wastes, they may lead to improper design and useless expenditure. Acid mine water drainage is one of the cases in which sewage disposal practices are quite inapplicable. However, acid water is a factor that is growing in importance to the coal industry and requires its earnest consideration.

Lime Treatment for Acid Mine Water

Among many of the individuals and groups pressing for an accelerated improvement in the sanitation of the streams, there is held a popular belief that the acidity of mine drainage water can be neutralized through the use of lime in some form. Such an assumption is a gross oversimplification of the problem, although it is true that in the laboratory, synthetic acid water may be neutralized by the addition of lime, the acid water from mine drainage is not the simple synthetic product prepared by the research chemist.

An example of the use of lime was presented by L. D. Tracy before the American Institute of Mining and Metallurgical Engineers in August 1920. His paper described a mine water neutralizing plant at the Calumet mine of the H. C. Frick Coke Co. which had been in operation during World War I. However, there were two unique factors which made this operation temporarily successful at that time and at that location. First, due to the naval blockade of the Allies, the supply of iron hydroxide from Germany was cut off and consequently there was a market for this by-product which could be produced from the water neutralizing plant. Second, a rather severe drought was experienced at the time and the treated effluent was used as quenching water on the beehive coke ovens of the Frick company. At the end of World War I, German imports were resumed and as there was no further economic justification for the water neutralizing-plant, it was discontinued.

However, frequent references to this treatment have recurred in literature since that time and many applications have been presented for permission to use the method to overcome acid mine water. Such actions give the impression that a solution of the problem has been known for years, but has not been used, due to the reluctance of the coal industry. It may be profitable therefore to examine some of the facts of the case.

According to the Ohio River Pollution Survey (Supplement C, 1942, Table Ac-1), the acid load carried by the Monongahela River and its tributaries is approximately one million tons per year (920,656 tons). For treatment purposes, if a 100 percent reaction is assumed, there will be required approximately one ton of lime for each ton of acid, equivalent to 1,000,000 tons of lime per year. The quantity of limestone sold on the open market in the U. S. A. in 1944 amounted to 6,473,563 tons. Out of a total of 210 active plants, 25 percent were in Pennsylvania and produced 1,026,292 tons. Thus there would be required a lime consumption equivalent to the annual amount prepared in Pennsylvania. In order to facilitate the precipitation of the solids thrown out of solution, numerous Dorr thickeners would be needed.

The precipitate removed would be in the form of extremely watery sludge (50 percent water) that would require drying with vacuum filters and heat dryers. The problem of the disposal of such huge quantities of ferric hydroxide is stupendous. The possibility of using the material as a pigment has been explored; but two factors are detrimental to the scheme.

(1) The quantity produced would be far in excess of the amount required by the paint industry.

(2) The presence of lime in the precipitate would make it inacceptable as a source of pigment.

Suggestions have been made to use the ferric hydroxide deposit as a source of iron, and undoubtedly there would be a sufficient amount available. Unfortunately the sulphur would be too high and the process too expensive to warrant its use. A further difficulty would be encountered in the type of effluent that would be discharged. It would be high in calcium sulphate giving "permanent hardness" to the water and would require costly water treatment for domestic and industrial uses. Such a treated effluent may cause foaming in steam power boilers if they are operated at high temperatures and pressures.

So much for the "popular" solution of the problem.

The Biological Oxygen Demand

Pollution from organic matter is caused by the decomposition of organic compounds through the action of certain types of bacteria and other organisms. These organisms consume the organic solids and combine them with oxygen to produce the energy for their life processes. The reaction by which the organisms break down and utilize organic matter is known as "biological decomposition." Such biological decomposition is commonly considered as divided into two processes known as "anaerobic" and "aerobic." Anaerobic decomposition is said

to take place in the absence of elementary oxygen.

Since the organisms causing the reaction require oxygen in the same way as others do, the oxygen is taken from the organic compounds. Organic matter is composed of carbon, hydrogen, oxygen, nitrogen, sulphur and a few other elements. The removal of oxygen leaves combinations of the remaining elements forming compounds such as methane (marsh gas), hydrogen sulphide, ammonia, and others having little or no oxygen. Many of these products have distinct odors causing the odor nuisances of polluted streams. When such conditions are severe, they are said to be "septic," and active life of a stream is impaired and often destroyed by the toxic nature of the compounds produced by this kind of decomposition.

"Aerobic" decomposition is said to take place in the presence of elementary oxygen. When oxygen is available the two processes take place simultaneously, the products of the anaerobic processes are immediately oxidized and are therefore not noticeable. The final products of the aerobic processes are stable compounds such as carbon dioxide, water, nitrates and sulphates. These compounds have a beneficial and exhilarating effect on the animal life of a stream in contrast to septic conditions. Oxygen, therefore, is the vital element for the biological decomposition of an organic waste. It is the "biological oxygen demand or B.O.D."

When the organic wastes are discharged into the stream, decomposition by the organisms starts immediately; the oxygen starts depleting and then due to stream flow, etc., it begins to be replaced. If the oxygen in the water is sufficient for complete aerobic oxidation of the organic matter, stable final products will result with their beneficial results. If the oxygen in the water is not sufficient, it will first be entirely depleted, after which the stream will become septic due to the formation of the products of anaerobic decomposition. It is this biological activity that is held in abeyance due to the bacteriostatic effect of the acid mine water drainage. The actual measure B.O.D. is, however, inapplicable to the mine acid problem.

The Mine Sealing Program

From the foregoing comments, it is clear that to date no satisfactory solution to the acid mine water problem has been found. There are, however, certain measures being adopted in Pennsylvania under the direction of the Department of Mines in an effort to reduce or control the quantity of acid mine drainage that is being discharged to the stream system. It is known as the Mine Sealing Program which actually is the method developed by the U. S. Bureau of Mines in 1925 and employed by the Works Project Administration. However, investigations have been in progress for some time to accumulate fundamental data relating to the flow of acid mine water both from sealed and unsealed workings; although the work is by no means complete, sufficient information has been collected to indicate that a re-evaluation should be made of the mines' sealing program.

This method is based on the theory that by excluding the entrance of air into the mine, the oxidation of the pyrite, marcasite, and other sources of sulphur in the presence of water is prevented. Unfortunately many of the mines in the Appalachian fields have shallow cover with cracks in the overburden extending from the seam up to the ground surface. Under such circumstances there is ample opportunity for the ingress of air to the workings and the effects of sealing are nullified to a great degree. In Pennsylvania, the mining law requires that all active mines with worked-out areas shall ventilate those areas in order to prevent the accumulation of explosive or noxious gases. Thus there are two requirements in direct opposition to each other—seal the worked-out areas to prevent the entrance of air, and ventilate the worked-out areas to prevent the accumulation of dangerous gases.

Strip Mining Presents a Problem

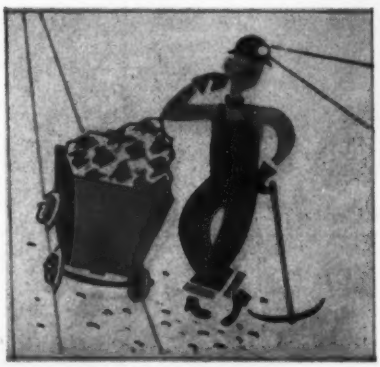
It is the strip mines, however, that cause the greatest concern. Where the ground is disturbed and piled in porous heaps with a high angle of repose, the surface waters and drainage readily pass through the pile and become polluted with acid. At the commencement of strip operations, the water drainage may be alkaline, but as time passes the water very frequently becomes acid and the damage is done. The strippers are required to post a bond of $300 per acre with a minimum of $3,000 for rehabilitation of the mined-out area; but in numerous cases they elect to forfeit the bond rather than repair the soil.

The Pennsylvania Sanitary Water Board has the power to prevent the stripping of coal either on a present operation or a new one, if the Board considers that pollution will result. This sweeping authority is of considerable concern to the individuals comprising the Board. Owners of acreage which is underlain with coal have certain mineral assets which they may desire to exploit. If perchance such acreage is located on a watershed whose "run off" is polluted, then permission may be granted to work the property. On the other hand, if the acerage is on a clean stream watershed, then permission may be refused. The members of the Board are well aware of such inequities and invasion of personal rights.

With the phenomenal development of earth-moving machinery during the last decade, many more tons of coal have become potentially available by stripping methods, thus enhancing the industrial economy of the Commonwealth which is based on its mineral resources—fuel. On the other hand, the rapid growth of new industrial enterprises (especially in the chemical field) in Pennsylvania has made the demand for clean water imperative. The Water Board is extremely reluctant to adopt any measures that would hamper the industrial mineral wealth of the state. Rather would it work with the coal stripping industry to experiment and devise methods whereby the production of acid mine water drainage may be avoided. If such a method could be developed, then permission to operate would be greatly facilitated. Specifically, investigations are desired to test the following possible methods of control:

- The compacting of the soil to reduce porosity
- The employment of diversion drainage ditches to turn the water and prevent it from flowing through the excavations
- The use of drainage tile to conduct the water from the operations in the most direct manner
- The removal and replacement of top soil with a view toward rehabilitation of farm acreage.

In planning these tests, the Sanitary Water Board would avail itself of the skill and advice of the most competent individuals engaged in the study of this subject in order to assure a reasonable chance of success. It is doubtful, however, that any scheme could be planned that would not require modification. Nevertheless, suffiicent experience would probably be accumulated on which to base a more or less uniform method of preventing acid water drainage when mining coal by stripping methods.



IRRIGATION TUNNEL HOLED THRU EARLY TODAY; EXPECT WATER BY MAY 1

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THE DAILY SENTINEL

VOL. LVII GRAND JUNCTION, COLORADO, THURSDAY EVENING, APRIL 27, 1950. NO. 187

DAILY SENTINEL PHOTO)

TUNNEL HOLED THRU—Three men have the right to smile and the 1,500 ranchers under the Grand Valley project are smiling with them. The Grand Valley project tunnel was holed thru at 12:12 a. m. today. That means practically no crop loss. When the old tunnel section collapsed March 8 the area faced possible loss of crops valued at several million dollars. Shaking hands in the small initial opening of the new 2,240.5-foot section which bypasses the slide area which closed the old tunnel section are left to right: E. A. Peters, in charge of the job for Grafe-Callahan and Rhoades-Stafford Construction companies; Elmer C. Hart, assistant superintendent; Dale Oldrich, assistant superintendent; R. J. Mandeville, assistant for Ross Billings, who had charge for the Bureau of Reclamation, and Ray Bissonnette, tunnel superintendent. Daily Sentinel photo by Robert Grant.

2,240-Foot Bore Being Completed Over Month Ahead of Schedule

Cleanup Work Already Underway So First Water Can Be Turned In As Soon As Possible; Speed Record Set In Both Drilling and Contracts

A 2,240-foot bypass around that portion of the Grand Valley project tunnel No. 3 which closed completely March 8 was holed thru at 12:12 a. m. today.

Cleanup work was started immediately and it is expected the first water of 1950 will be in the 50-mile ditch below the tunnel May 1 or shortly thereafter.

The 1,500 project farmers are smiling. Without water in this arid climate their nearly 30,000 acres of rich farmland would have been unproductive this year. Nearly 9,000 acres of peach trees might have suffered irreparable damage.

A crop loss of $1,300,000 was expected in the event the tunnel section could not be opened by July 1. Now there will be little or no crop loss.

One of the most dramatic moments in the history of the Grand Valley is drawing to a close, that is, as far as the farmers are concerned. Denver and Rio Grande Western railroad trains still crawl past the mountain which stopped and silenced all the trouble.

The railroad has had no more trouble since a landslide stopped all rail traffic March 16 and 17. Some officials fear water seepage from the rock section of the tunnel which is not being sealed may cause trouble in the future, but the water in the Colorado river will submerge the bottom of the slide area and keep new slippage. The railroad is on guard.

If such maneuvers as the one last March 8 are the most that the slide area can produce, the railroad will be safe in that respect.

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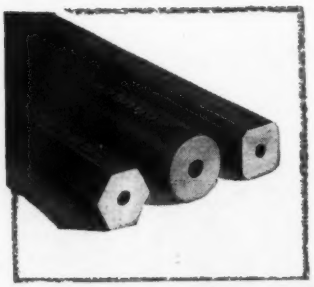

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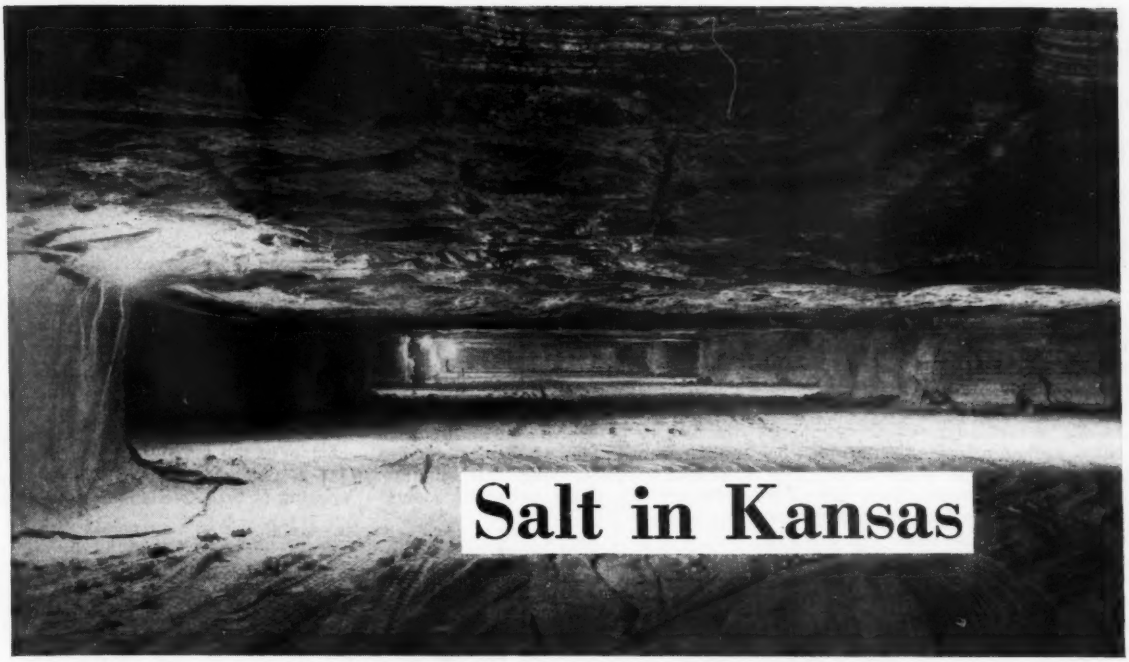


Salt in Kansas

A "king-size" room in the mine at the Carey Salt Co., Hutchinson, Kan.

Mechanized Mining Methods Enable High Production With Small Crew

By EARL K. NIXON
Geologist
State Geological Survey of Kansas

SALT, a mineral indispensable to civilization since Bible times; used by the Romans as part payment for soldiers' wages (the practice yielding our English word salary), and seemingly as necessary in agriculture as in industry —is so ordinary a substance that it is actually called *common salt*. Its ready availability almost anywhere is now taken for granted, as present day children take automobiles for granted. It was not always so.

Only since 1900 or thereabouts, has salt become a really important raw material for the chemical industries which currently consume fully two-thirds of the United States production.

The present Kansas salt industry is 63 years old, although its beginnings go back another 20 years. It is a pioneer which started almost as a "dead end kid," and weathered its hectic, adolescent years among the quarrels and bickerings of land, cattle, and railroad interests of the frontier state. It has now leveled off in its early middle age into a stable, competent, and respected industry . . . a credit to the men who have made it as well as to the state which embraces it.

On September 18, 1806, Zebulon Pike, the noted early day explorer for whom Pike's Peak was named, wrote in his diary, ". . . marched at our usual hour, and at 12 o'clock halted at a large branch of the Kansas (Smoky Hill River) which was strongly impregnated with salt."

During the 81 years that followed Pike's observation, salt from Kansas salt marshes and springs was eaten raw or boiled down in kettles, sold, bartered, and fought over by Indians, frontiersmen, missionaries, renegades, explorers, and later immigrant colonists and merchants. Some crude stills and even solar evaporators were built.

As early as 1867 production of evaporated salt from a brine well near Solomon City in western Dickinson County reached about 10,000 bbl per year.

But the real Kansas salt industry was started, almost with a "whoosh," in September 1887 when a well drilled for petroleum near Hutchinson cut beds of rock salt nearly 300 ft thick. With 250,000 immigrants entering the State the preceding year, 1886, with a land boom on, and with five railroads under construction, the finding of salt at Hutchinson magnified the trend to runaway proportions. Men, mainly from New York state, who knew the business of brine wells and salt manufacture, began immediately to build plants in the Hutchinson area. Thirteen salt plants are said to have been built following the Hutchinson discovery in 1887. Thirty-six companies were organized in the six-year period from 1887 to 1892.

Within two decades following the discovery, salt production zoomed to high figures, competition was described as "cut-throat," and the price reportedly went as low as a few cents per barrel. The weaker companies failed or were bought up by the stronger. The industry became stabilized soon after the turn of the century and neither production nor industrial policies nor the producing companies have changed greatly since. Today, methods and plants are modern and the operations are models of the domestic mineral industry.

Wide Geologic Distribution

Two known salt zones of significant thickness—a dozen feet, say, as a minimum—are distributed over more than 30 counties in the western two-thirds of Kansas. The two zones are: The more important Hutchinson salt mem-

Published with the permission of the State Geologist.

ber of the Wellington shale, and a salt member lying roughly 1000 ft higher stratigraphically in the Nippewalla group. Both zones are of Permian age, which also is the geologic age of the salt deposits of northern Texas and of the important Stassfurt deposits in Germany.

In Kansas, the salt zones lie within a thick sequence of shales predominantly of continental origin, locally gypsiferous, and containing some rather thin marine limestone layers.

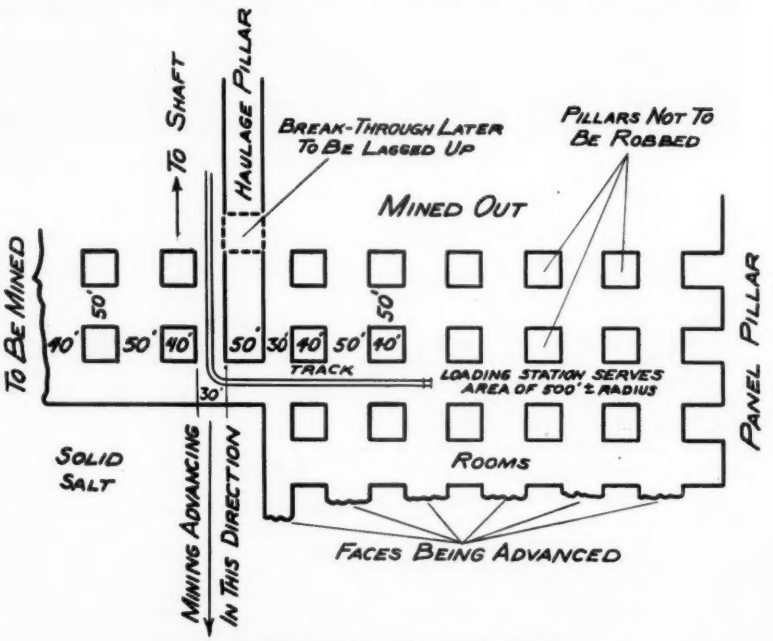
The salt beds, or "sections" as they are recorded in the logs of numerous holes drilled for petroleum, are those thicknesses which seem to be composed largely of rock salt. In detail, the salt members (so far as present information goes) consist, from top to bottom essentially, of flat-dipping halite, sodium chloride, interbedded or interlaminated with shale bands. The latter vary in thickness from that of a pencil line to many feet, the boundaries being either knife-edge or, locally, gradational. Numerous beds within the salt sections are depositional mixtures of salt and silt or "shale" in which the variation in content, as one scans a vertical section, may run from almost pure salt to almost pure shale, or the reverse.

Seemingly, the only impurity of consequence noted to date in Kansas salt, aside from the shale, is anhydrite (or gypsum, the hydrous form of calcium sulphate) which commonly represents no more than a few percent of the rock.

Judging by the salt bed being mined near Hutchinson and Kanopolis, a section 9-12 ft thick near the base of the member, horizontal laminations of the salt in the form of tiny shale bands form the most obvious characteristic of the sedimentation of Kansas salt. These thin bands or laminae, which in many cases are merely dark layers of salt discolored by a small silt or shale content, are not wavy, but are straight and uniform laterally, suggesting deposition in quiet water. Some geologists regard these individual salt bands as probably the deposits of a single year, the shale bands corresponding to seasonal surges of muddy water into the basin.

Bass discussed the general structure of the salt beds and noted that the eastern boundary of the Hutchinson salt member, passing through Sedgwick, Harper, and McPherson Counties, is extremely abrupt and seems to be an erosional or solution contact. At Hutchinson the salt bed being mined exhibits what seems to be a definite system of incipient fractures, analogous to the "cleat" in coal. Whether or not the incipient fractures noted are definitely related to a local or regional structural pattern—the anticlines, uplifts, and basins—is not known.

As to origin, the Kansas salt beds doubtless were deposited in a relatively shallow, quiet sea by evaporation and concentration of saline waters. Probably the sea occupied an inland basin not connected (at least at the time of deposition of the Hutchinson salt member) with the larger Permian sea which deposited salt beds in northern Texas and New Mexico. Also, the Kansas salt beds (judging by the rather limited available information on their nature and composition) probably represent largely chlorides that have been redissolved, transported by streams, and laid down with modified composition in their present form and location. This could happen if streams carrying in solution, mainly the more soluble sodium chloride from an exposed or upwarped salt area, drained into the broad, shallow, closed basin—the Kansas area—where concentration and precipitation of brines formed thick salt beds carrying little sulphate. Evidence for these tentative conclusions is contained in the fairly well-known reactions that take place during precipitation of salts from sea water, and from the lack of conformance of the Kansas deposits with the established principles.



Mining plan results in 80 percent recovery

Favorable Mining Conditions

Salt production in Kansas is by two methods: By evaporation of brine from wells and by underground mining. Three mines, one at Hutchinson belonging to The Carey Salt Co., one at Lyons of the American Salt Corp., and one at Kanopolis of the Independent Salt Co. are operating in the State at this time. The Carey company has an idle underground mine at Lyons. Four salt companies have operating salt brine and evaporating plants. They are the Morton Salt Co., the Barton Salt Co. and The Carey Salt Co. of Hutchinson, and the American Salt Corp. of Lyons. Only the American Salt Corp. at Lyons has both its brine evaporating plant and its rock salt operation "on one lot." All operating companies were most cooperative in supplying details for this paper.

It has become the practice at Hutchinson to drill brine wells as 8-in. holes to a depth of about 65 ft and there to set and cement casing. The hole, reduced to 5⅝ in., is continued to about 160 ft, and another string of casing is set and cemented. The hole is then drilled on to the bottom of the salt section, at approximately 715 ft in the Hutchinson area. From the bottom of the casing at 160 ft to about 715 ft the hole is open. The surface spacing of brine wells is at 400-ft centers or thereabouts and the wells have a life of 30 or 40 years.

Clean water at natural temperature, about 70 F, is pumped under pressure of about 120 psi through an inner string of 2-in. tubing which goes down inside the casing to the bottom of the hole. Pressure brings the salt-laden brine out of the well through the larger casing outside the 2-in. tubing. The brine, at about 96 or 98 percent sodium chloride saturation, is conveyed to the evaporating plants. Old wells sometimes become connected underground when their solution chambers merge. Then, water may be pumped down through one well and brine taken from the adjacent one. Each gallon of water pumped into the wells ac-

Loaders and shuttle cars help maintain high man output

Elevating conveyor loading salt

counts for about 3 lb of salt, each gallon of brine bringing up about 2.5 lb of salt (2.65 lb if the solution be completely saturated).

Huge Rooms Stand Well

The underground mining of salt in Kansas reveals some features that are almost unique in mining practice. Most impressive even to mining men of broad experience is the first view of a "king-size" room or opening more than 1000 ft long, 50 ft wide, 8-12 ft high, with not a stick of timber in sight and no evidence of spalling or sagging of the roof (or of heaving of the floor). There are instances—an occasional experience at Lyons and Kanopolis—where rooms have developed roof sags after standing open two or three years. In such cases a layer of salt a few feet thick has broken to a shale parting, and the loosened layer must be taken down if the room is needed for a haulageway. It can be said, however, that the roof in Kansas salt mines gives comparatively little trouble.

One may not see a drop of water in the mines although the working levels range from 700 to 1000 ft below surface. Commonly a few gallons of water per day are caught at ledge and pumped to surface. Neither is there any seepage of natural gas into the workings although there are numerous oil and gas fields in the salt area.

Mining practice in the underground mines of the State does not vary much. The Carey mine at Hutchinson, compared with the average underground mine in the United States, would probably be regarded as a show place. It will be described as representative. A section of the salt 8-10 ft thick near the base of the Hutchinson salt member is mined by an ordinary panel or room and pillar method which has been changed little in detail for many years. Except near the haulageway, pillars are 40 ft square and rooms or spaces between the pillars are 50 ft wide. This gives a salt recovery of 80 percent of the area mined. At Kanopolis, both pillars and rooms are 45 ft wide, giving a recovery of 75 percent. Pillars are never removed. There is no visible subsidence of the ground surface in the vicinity of any of the salt mines.

Mechanical Equipment Used

Except for minor warps, the salt beds are flat. At present mining at the face is about one mile from the shaft station at the Carey mine. Mining advances away from the shaft and a pillar 50 ft thick (with occasional breakthroughs which are later lagged up) is carried along the main entry or tramming road to control ventilation. The tramming track is turned at 90 deg right or left from the main entry as much as 500 ft to a temporary loading station. The latter, equipped with a Joy PL-1117-RU ramp loader or elevating conveyor, receives the salt from pneumatic-tired shuttle cars direct from the working face. When the salt has been mined to one loading station from a radius of about 500 ft—seemingly the optimum haulage distance for the shuttle cars, the station is moved or advanced to a new point to cut down the average haulage distance.

Drilling of the salt face is by a crawler-tread jumbo mounting four Howell drills operated by two men. The jumbo is moved by electric motor supplied by cable. Three horizontal rows of 1⅝-in. diam, 10 or 11-ft holes —about 44 to the round—are drilled at approximately 54-in. centers across the 50-ft room face. It requires about three minutes to drill a hole, and about 2½ hours to drill a room face. Central Mine and Equipment Co. detachable, throw-away bits are used.

The entire face is undercut at the floorline by a Goodman No. 12-G-3A shortwall undercutter with 10-ft bar making a 6-in. kerf. A ground cable supplies 440-v a-c power to the machine which moves automatically by cable feed across the even floor at four inches per minute.

The holes are loaded with Trojan TL 503-M, 40 percent dynamite with instant detonators in the bottom holes and delays to fire the upper rows in succession. Each round of holes blasted advances the face about 9½ ft and yields a muck pile of about 250 short

Two men on this four-drill jumbo drill out a 44-hole round in 2½ hours

tons of salt. Roughly 1.9 lb of powder are consumed per ton of product. Blasting is calculated to give a minimum of fines. Chunks that break too large are reduced with a jackhammer.

A Joy 11-BU continuous loader (or "craw-dad" in the vernacular) mucks the salt into the shuttle car for delivery to the loading station on the main haulage. The shuttle car, a Joy 60-D3-MS-1 is powered by two 24-cell storage batteries which are charged daily. It carries ten tons of salt at a speed of five or six miles per hour, and discharges its load into the hopper of the ramp loader which fills the tram cars.

Tramming to the shaft is by an eight-ton General Electric combination trolley and storage battery underground locomotive drawing a trip of 14 cars of four tons capacity. The loaded cars go through a rotary dump at the shaft station and the salt is hoisted through a vertical, concrete-lined shaft in skips working in balance, the man cage attached under one skip.

The entire underground crew at the Carey mine at Hutchinson consists of 12 men, who work one shift, and the production runs about 600 tons per day. The crew consists of one maintenance man, one powder man, two drillers, two undercutter men, one Joy loader man, two shuttle car operators, one loading elevator man, one trammer, and one shaft station man.

At surface, the salt passes through a Kennedy Van Saun 26 by 34-in. jaw crusher set to about one-inch opening, then to vibrating sizing screens and on to the sacking department or to bulk storage bins. Some operators mix selected mineral additives with part of the salt for sale in bulk or as 50-lb pressed blocks for stock salt or for special uses. Labor receives $1.14 to $1.34 per hour, works an eight-hour day, a 40-hour week and belongs to the United Mine Workers Union.

In Kansas, rock salt is commonly sold in four or five grades according to size. See Table I. The coarse grades sell to industrial consumers for $5 to $6 per ton f.o.b. plant, and the finest sizes at about $4. At the present time, roughly one-third of the rock salt produced in the State leaves the plants by truck, and two-thirds by rail. The truck deliveries are increasing.

Refining for Market

The refining of salt by evaporation of brine from wells as practiced in Kansas is by two methods: By steam grainers and by vacuum kettles. Most evaporated salt is produced by the vacuum method which yields "granulated salt," commonly used in large quantities by the meat packing and soap industries, and for stock salt in bulk or pressed into blocks. Steam grainers produce so-called "flake salt" which is carefully screened to the desired sizes to effect the necessary rate of solubility demanded by certain users. The most finely-crystallized salt, almost as fine as face powder, is sold to mixers of patent cake and pancake flour; that with the next larger sized crystals goes to the butter makers. Grainer salt is used mainly in food processing and costs considerably more to manufacture than vacuum kettle salt although the two are substantially of the same quality.

In the vacuum process, brine which is near the saturation point in salt concentration is pumped into vertical tanks or kettles about 20 ft in diameter and 60 or 70 ft high with cone-shaped tops and bottoms. Brine enters midway of the kettle; low pressure steam —exhausted from the turbine-electric generator or engine at the power plant, enters through the side of the first kettle and heats the brine which is circulated around hot tubes by a down draft propeller; and the salt crystallizing as individual grains with little chance to form aggregates, is drawn out of the bottoms of the kettles as a slurry to be filtered, dried, and packaged or stored for bulk shipment. Standard drum-type Oliver filters and rotary driers are used. Additives such as .01 percent of potassium iodide and suitable stabilizers are mixed with portions of the salt at suitable points in the circuit to make certain desired products.

To obtain high over-all thermal and power efficiency in the salt plant, natural gas is burned to produce steam which is converted to electrical power in a steam turbine or engine. Exhaust steam from the power plant at about ten pounds pressure is used to heat the brine in the first vacuum kettle; the vapor from the boiling brine in the first kettle is used to heat the brine in the second kettle in the series; vapor from that kettle goes to heat the third, and so forth. The kettles, commonly four to the plant, are connected either in a series or parallel arrangement. By maintaining a higher vacuum in each succeeding kettle, the brine is made to boil—although at a lower temperature than in the preceding kettle. In the last kettle in the series, the brine which is under the highest vacuum, may boil at a temperature as low as 110 or 120 F. Salt precipitation is continuous during the runs which vary from one to several days. After each run the kettles are emptied to remove salt that adheres to the flues. Periodically the kettles are chemically treated to remove sulphate scale.

Steam grainers are shallow, open tanks about 2 ft deep by 12-20 ft wide by 125-150 ft long, with immersed

Table I.—*Screen sizes and approximate salt content of rock salt as sold in Kansas*

Grade	Through mesh	On mesh	Approx. NaCl content
No. 2	⅝ in.	⅜ in.	91%–93%
No. 1 special	⅜ in.	.25 in.	95%±
No. 1	.25 in.	.158 in.	94%–96%
No. 7	.158 in.	.080 in.	97%±
No. 4	fines through .080		96%±

Headframe and rock salt shipping plant of the American Salt Corp., Lyons, Kan.

steam pipes for heating the brine and fitted with mechanical rakes for removing the salt. Grainers are filled with brine which is evaporated without agitation or vacuum. Salt crystals forming at the surface of the brine gather into aggregates and sink to the bottom as their increasing weight breaks the surface tension of the liquid. Although the salt always crystallizes in tiny cubes, the cubes make both irregular and cup-shaped crystal aggregates which supply also a coarser product desired by some users. The salt, moved to the discharge end of the grainers by rakes, is pumped carefully or conveyed to avoid breaking up the crystals, and is then dried, screened to size, and packaged or stored for shipment.

Constant and careful laboratory control is maintained to assure the uniformly high quality of salt produced in these evaporating plants. The fine salt from Kansas plants commonly runs more than 99.2 percent sodium chloride. Table salt carefully screened to uniform grain size receives a bit of inert additive, usually magnesium carbonate or perhaps a phosphate, to prevent lumpiness and to promote free flowing.

The analyses of Kansas rock salt, evaporated salt, and brine vary through small limits. Average figures are given in Table II.

Table II.—*Approximate average analyses of Kansas salt and brine*

Chemical	A Grams per liter	B percent	C percent
Sodium chloride, NaCl	304.24	99.34	96.505
Calcium sulphate, $CaSO_4$	5.261	0.61	3.234
Magnesium chloride, $MgCl_2$	1.233	0.03	0.151
Calcium bicarbonate, $Ca(HCO_3)_2$	0.272		
Calcium chloride, $CaCl_2$	0.260	0.02	0.002
Ferric oxide, Fe_2O_3	0.0001	0.001	0.008
Acid insolubles		0.001	0.100

A is an average analysis of brine from wells in the Hutchinson area.
B is an approximate average analysis of Kansas evaporated salt as produced at Hutchinson and Lyons.
C is a typical analysis of rock salt as it is mined at Hutchinson.
Spectographic analyses made by the Geological Survey of Kansas laboratory show no significant trace elements in the salt.

Extensive Reserves

As a minimum figure, Kansas salt reserves are ample to supply the present needs of the entire United States for more than 30,000 years. That would be the reserve if a bed ten ft thick, as is mined in Kansas at present, were to be calculated over the known salt area in the State. Actually, the average thickness of the salt over the area is more than 200 ft.

The calculation of salt reserves is as follows: 640 (acres) × 36 (sections/twp.) × 25 (twps./county) × 30 (counties underlain by salt) × 3000 (tons salt/acre-foot) × 10 (salt thickness) = 518.4 billion tons of salt.

Economic Aspects

Salt, the one item in the entire mineral kingdom with which all human beings are familiar, is so widely distributed over the earth that its value in the ground or as ocean brine is almost nil. Reserves are almost unrelated to value or price.

Rock salt at the plant is worth (say, in ton lots) $5.00 per 2000 pounds. But the evaporated variety, purified, carefully screened, treated to make it flow freely, perhaps iodized, packaged, labeled, shipped in cartons to the distributor and on to the retailer, and purchased by you from the grocer's shelf—costs 10¢ per pound package. The value is increased 40 times by manufacture. This increment is not excessive.

Salt mining is so comparatively simple, both as brine and by underground mining, that its produced value should be low. It *is* low, indeed, when one considers the host of users each of whom requires a slightly different product. The difference may be grain or screen size, shape of crystal (some want a flat flake), rate of solubility, the amount of shale, gypsum or anhydrite permitted, or in the purity of the sodium chloride itself. The sale or disposal of salt fines which contain a visible amount of inert but dirty-looking shale—the so-called "No. 4 salt problem"—plagues the Kansas industry to some degree. Research to satisfy consumers on both quality and price of the salt, continues on the various problems.

The market will only consume so much salt; people don't buy extra quantities anticipating price changes or, like an extra radio set, because it's nice to have around. Competition follows a pattern, nevertheless. The salt industry is that way.

Evaporating plant of the Carey Salt Co.

Missouri and Its Natural Resources

A new 16-mm film in sound and color has just been added to the U. S. Bureau of Mines free loan library of educational motion pictures. Missouri and Its Natural Resources, ninth in a series of films depicting the mineral and other natural wealth of states, depicts the varied natural resources of the "show me" state. Produced in cooperation with the Sinclair Refining Co., the film is ready for distribution to schools, colleges, scientific, technical and civic associations and other organized groups.

The film tells how its central location near two great rivers—the Mississippi that borders it on the east and the Missouri that cuts across the state—made Missouri a staging area for groups of pioneers in the covered wagon days. It shows how today, railroads, airlines and modern highways add to the commercial importance of the State, while its mines and quarries, forests and farms provide raw materials for industrial plants.

Requests for free, short-term loans of the 33 minute film, should be sent to the Bureau of Mines, Graphic Services Section, 4800 Forbes St., Pittsburgh 13, Pa. Stamps to prepay parcel post charges on the 7-lb film should accompany the request.

Wheel excavator stripping 80 ft of overburden

Wheel Excavator For Overburden Removal

A Unique Machine for Removing Heavy Overburden Serves Stripping Operations of United Electric Coal Cos. at Cuba, Ill.

By J. J. HUEY,
Chief Electrical Engineer,
United Electrical Coal Cos.

DEVELOPMENT work on excavating machines employing a conveyor belt, together with a bucket line type dredge or wheel digging tool, has been going on in Germany for many years. (See Fig. 1.) The later device has had considerable use in removal of overburden in large German strip mines, undercovering a thick vein of material much like lignite under overburden depths up to 250 or 300 ft. In order to make this an economic proposition, it is of course necessary to have a thick coal seam or several coal seams after removing such a large quantity of overburden material.

Starting in 1943, two considerably different wheel excavators have been developed for application to tandem operation in the Illinois strip fields. The particular area in which this equipment is used is fairly free of rock and therefore lends itself well to this type of tool. Near the town of Cuba, Ill., a unit is handling overburden of about 80 ft depth with approximately the top 40 percent being removed by the wheel excavator. The wheel makes a bench along the highwall and discharges dirt out to the side to a short conveyor belt known as the ladder belt, which in turn discharges to a long conveyor, which then carries the material directly to the spoil pile.

The Cuba machine has an over-all maximum length of approximately 318 ft with a 70-ft digging ladder on the wheel and a 32-ft crowd-retract motion; a digging reach up to 118 ft from the center line, and a spoiling reach of 200 ft from the center line. It is able to dig from approximately 25 ft above the coal to about 70 ft maximum height, and in cases where it is necessary to dig to 80 ft or 85 ft it is simply necessary to undercut the top of the bank and let it fall to the wheel. This has been satisfactorily done.

This wheel (see Fig. 2) operates at a speed of approximately 7 rpm, the 48-in. ladder belt at a speed of 700 fpm, and the 48-in. stacker belt at 1000 fpm. This speed results in a marked throwout of material from the stacker conveyor. On this machine the ladder belt is approximately 70 ft long, and the stacker belt approximately 250 ft long. The inboard end of the ladder is arranged to travel back and forth a distance of 32 ft on the gantry structure. The construction used makes it possible to balance the weights of the wheel and digging ladder against the stacker conveyor bridge and belt machinery for reasonably good stability.

With an amply strong structure the new style wheel can be run at almost any speed up to the dumping limit. These wheels have been run up to approximately 8 rpm and still have not reached the limit so far as dumping ability is concerned. When such speeds are considered, however, it is most desirable to minimize the WR^2 of all the machinery as well as to incorporate a slipping clutch since the shocks to the machine are much greater at the higher speeds. Plans call for an additional conveyor belt which will be inserted directly into the wheel, thus assisting the dumping condition considerably due to direct removal of the material at a low point, and at the same time reducing the side projection which is now caused by the front portion of the belt equipment. In other words, the conveyor tail pulley, which is at the side of the wheel, projects a distance of 5 ft or 6 ft along

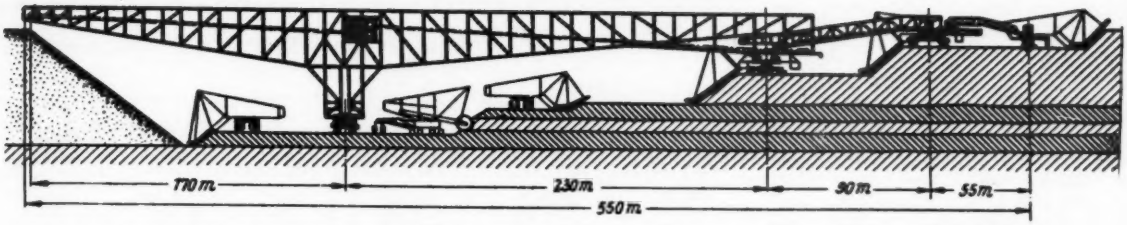


Fig. 1. German excavator nearly 2000 ft long strips heavy overburden at rate of 7200 cu yd per hour

side the wheel, making an obstruction in the operation of the machine.

In the event that clean or sandy material is to be dug, a more simple type machine would be desirable. However, where sticky clay or similar material is involved it is necessary to put up with the wear of parts and simply plan on the use of wear plates and hard surfacing materials for the critical points.

Considerable experimental work has been done with the use of high manganese for both lips and teeth. These do not operate in the same fashion as with a shovel or dragline bucket since the motion is circular, and consequently the tooth wear is across the point rather than down the top and bottom faces. Therefore, more experimental work is in order to solve this wear problem.

Enclosed Drive Preferred

At the present time it appears that a completely oil enclosed gear set offers the most satisfactory drive. With main bull gears driving the wheel proper, it is not possible to completely prevent entrance of dirt without the use of oil-tight and oil-flooded gear cases. Due to the large and rather flimsy construction of these cases they are easily broken, bent and cracked, so that dirt has fairly easy access to the main bull gears. It is almost impossible to even maintain any form of gear shield on such gearing. Therefore, a drive is being developed which will use a smaller diameter oil-tight and oil-flooded gear case.

Preliminary experience indicates that this can be satisfactorily worked out. The smaller diameters lend themselves much more readily to the construction of a rugged case which is necessary to maintain proper clearances and tight fits in spite of the extreme abuses involved.

On a drive of this type one of the main problems is to prevent deflection in shafting and structures. A special spider construction will prevent all measurable deflection and permit operation of the gears in a more normal manner.

Heated Buckets Keep Clean

To minimize build-up of dirt within the wheel and on slope sheets, an electric current of 4-6 kw per bucket is used to maintain the surfaces of the buckets themselves at a temperature of around 150 F in moderate weather. This heat causes a dry surface which eventually becomes somewhat dusty and prevents the accumulation of large quantities of gummy clay. As a result, the clay builds up slightly and drops out intermittently; otherwise it is necessary to frequently hand clean such parts.

A continuously rotating type slope sheet cleaner has been developed which consists of a heavy duty worm drive on the underside of the slope sheet with a large shaft of about 4-in. diam projecting through the sheet. This is driven by means of a gear motor on the underside to obtain a speed of approximately 4 or 5 rpm. The shaft is strategically located to mount a heavy cleaner blade that sweeps the surface of the slope sheet. Without such a cleaner a slope sheet will build up in a matter of minutes to a point where only one-half or one-third of the material will drop out of the buckets.

Another problem that confronts the operator is high winds that create excessive loading on various parts of the structure. The machine is equipped with sway cables, but these are not adequate to stand extremely high winds, and it is possible to exceed the elastic limit in the structural parts if one persists in operating under severe wind conditions.

Belts Run at High Speed

Conveyor belts must be designed to handle any size of rock that may be dumped upon it by the wheel and at the same time, handle much greater yardages than would ordinarily be handled on a comparable belt. (See Fig. 3.) Any standard heavy duty troughing roller construction is unsatisfactory for this class of service since the main conveyor is operating at 1000 fpm and on another machine at 1250 fpm. This creates serious impact conditions in the event rocks and boulders are placed on the belt. A rubber-covered impact roller has given good success; this uses a large 1-15/16-in. diam rotating shaft with two self-aligning roller bearings in pillow blocks mounted on heavy channel-iron bases. These are not arranged in an actual assembly of three rollers but are staggered to permit placement of the pillow blocks, and are closer together than normal. The combination has resulted in a satisfactory arrangement even where large quantities of boulders are being dropped upon

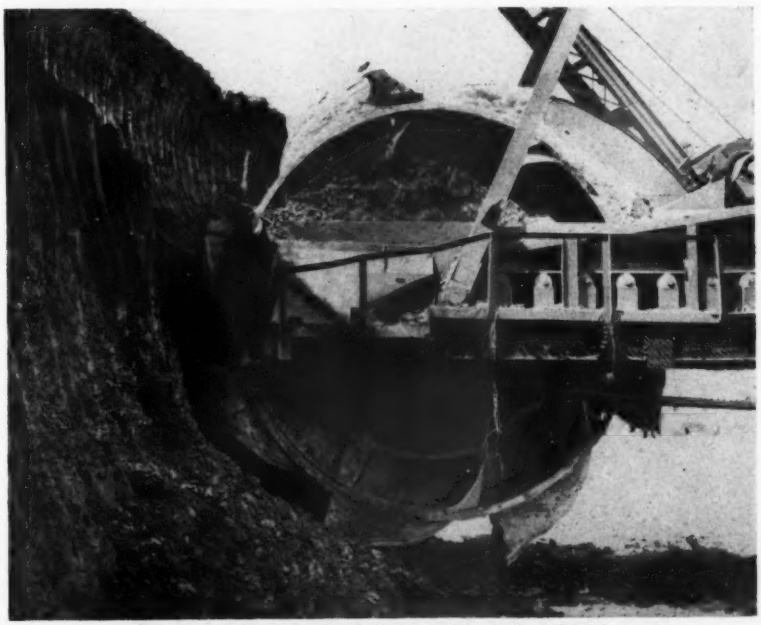


Fig. 2. Close up of wheel shows cutting action of buckets

the stacker belt. To date there has not been a single failure of any of these parts in more than a year's operation. This is an outstanding record in view of experience with all other types of roller arrangements.

One serious problem on high speed belts occurs when boulders are present. Occasionally a roller is knocked out, causing a sag in the belt, and unless it is immediately replaced, the next boulder will deliver a heavy blow to the following good roller. Constant and immediate replacement of defective rollers is therefore imperative. With the variety of material being handled on the belts it is essential to use fairly high side-boards to minimize spillage. These should be elevated about 2 in. from the belt to prevent wearing; also they should be moved in 5 or 6 in. from either edge. In certain cases soft rubber packing has been used which rides directly against the belting, but this is extremely undesirable due to belt wear. It is only employed in a few tight spots to prevent sifting of any material past the edges. In no case should rubber belting be used for this purpose.

General belt practice applies insofar as transfer points are concerned. It is an axiom that after material is laid down on a belt it should be left alone. However, due to the crowd and retract arrangement on these machines it is essential to have a transfer point between the ladder belt and the stacker belt. In this case the use of a traveling loading hopper together with the rubber impact rollers solves the problem reasonably well.

The experience at this operation indicates that no important difficulty is involved in the acceleration of the material between the two belts, namely from 700 to 1000 fpm, since the top jacket of the belt is made extremely heavy to stand such abuses. To date, belt life has been limited either by cutting at the edges or piercing from sharp rocks.

It is necessary in some cases to train or direct the travel of the belt to prevent its wandering from side to side. Often dirt will sift underneath the belt and cause it to travel off to one side, scraping the edges or actually tearing them. One means of reducing this is through the use of a self-aligning roller placed on the lower or return side, guiding the belt to the proper point on the tail pulley. In this case any side deplacement of the belt causes a swinging of the self-aligning roller and results in a correcting action. In another case an air-actuated guide control was used which has worked with extreme success to steer a belt 60 in. wide running at 1250 fpm.

Operating and Production Records of Wheel Excavator at Cuba No. 9 Mine, United Electric Coal Cos.

Fiscal Year Ended July 31st	*Total Annual Production Cubic Yards*	*Average Monthly Production Cubic Yards*	*Average Hourly Production*	*Operating Hours*	*Average Operating Hrs. Per Mo.*
1945	942,898	78,575	537	1,756*	146
1946	1,752,761	146,063	594	2,951	246
1947	2,556,433	213,036	882	2,898	241
1948	4,950,327	413,068	1,259	3,931	328
1949	4,506,823	380,685	1,351	3,335	278
Total	14,709,243		988	14,887	

*Some testing included.

Fig. 3. Over-all view shows how material passes to conveyor belt

Good Clearance Essential

Every possible consideration should be given to provide large clearances at all points along edges so that the belt can wander a foot or more in either direction without coming into contact with any steel parts. This is particularly necessary on a machine of this type since dirt is always finding its way underneath.

Another problem which evidently was obviated through the use of high belt speeds was freezing of material on the belts during extremely cold weather. Operating at 400 fpm, as is normally the case, from 4 to 6 in. of dirt would be frozen to the top side of the belt, causing excessive sag in the return and resulting in a shutdown of the machine. However, as soon as the belt speed was increased to 600 fpm this problem vanished; this is partly due to the greater centrifugal action at the pulleys and partly to the shorter time which the material rests upon the belt which lessens the opportunity for freezing.

On units of this type it is necessary to use several return rollers, which, of course, must roll against the dirty side of the belt. A small diameter heavy roller operating at relatively high rpm provides a better return roller since it revolves fast enough to keep throwing off any built-up material. Large diameter rollers on the other hand must be constantly scraped where clay is encountered, and this results in considerably greater roller wear.

Wheel Operation

In discussing the operation of wheel excavators it is desirable to point out that these machines function in tandem with a stripping-shovel in almost exactly the same manner as done by a dragline in the pit. In short, the wheel simply makes a deep bench in the highwall, thereby effectively reducing the depth of overburden which the shovel is compelled to handle.

In the normal method of operation

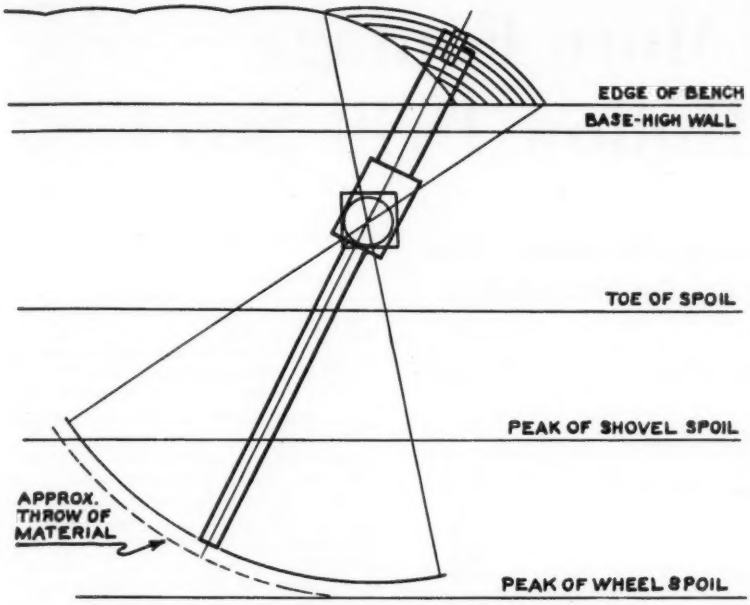


Fig. 4. Plan of operation for digging and casting material

where a 50 ft move-up is made, the cuts are produced at an average of about 20 deg off of perpendicular to the highwall. (See fig. 4.) Because of the construction of the machine and use of a 32-ft crowd-retract, it is not possible to place the machine to dig on one side and dump directly opposite. Before moving up, the wheel is fully retracted and upon resuming operation it is swung back and forth making cuts of approximately one foot in depth. The bulk of the material is placed somewhat off of the optimum point, namely, directly behind the machine, in which case the maximum dumping reach would be obtained. In spite of this fact it is possible to spoil overburden at a considerably greater distance than with a dragline.

Application to Overburden

In general, the digging operation of a wheel excavator is similar to that of a milling cutter. As already mentioned, the cutting motion is circular, and the cuts are of tapering thickness starting at zero on the bottom, becoming maximum at the horizontal point. Due mainly to this condition, the operation is rather limited in its application. By the same token, this gives a considerable advantage when digging a hard homogenous material such as shale. This material will peel and cut readily, and therefore offers little obstacle to a wheel excavator; as a matter of fact, the wheel is able to dig in hard shale without shooting where a large stripping shovel is unable to do so. It is also capable of digging in clay, sand, soft or hard shale with a varying degree of ease. Sharp teeth are a great help in this material, and especially so in the case of shale.

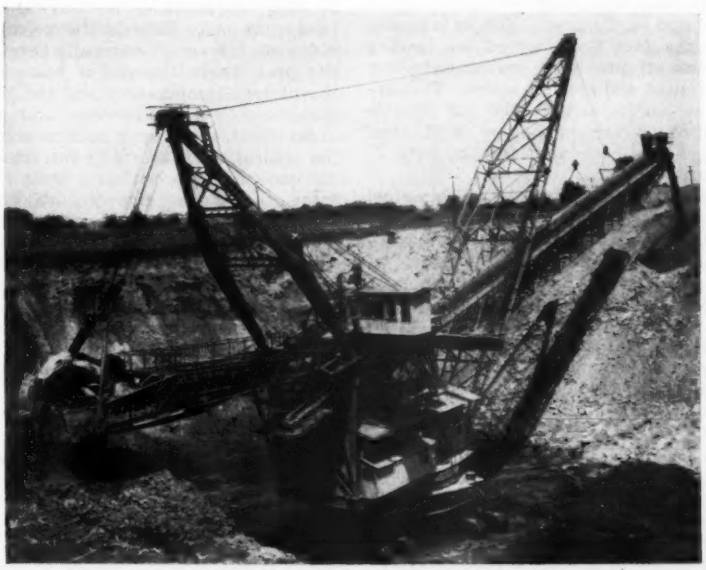
Overburden which is heavily strewn with boulders should, if possible, be avoided since excessive numbers of boulders will cause continual shock and ultimate fatigue of the metals. In such material it is desirable to have two distinct wheel speeds as well as two belt speeds, and a drop of at least 50 percent in each for digging in boulders. As a rule, boulders are in small areas and also lay in very definite stratas so that it is possible to operate on one level at low speed where they are encountered. On the next level, boulders may be very scarce, and speeds can be correspondingly increased.

It is doubtful that this machine will ever be satisfactory for digging any rocky strata since blasting would be out of proportion to the value of the coal thus uncovered. Also, great quantities of rock would be destructive to the belts.

In severe winter weather, frost becomes a great problem since the ground does not dig well, and has a tendency to come out in large slabs. It will consequently break off back of the wheel cut and come out in large pieces, which are highly destructive to the belting. Some means must be found to satisfactorily prepare the surface during severe and prolonged cold weather where the frost may extend up to 3 ft in depth.

Experience has shown that it is necessary to more or less completely remove trees and stumps since the wheel will not satisfactorily dig them, and they clog up conveyor equipment excessively. This, however, should not be too difficult a problem.

The accompanying table gives the actual performance of this machine over the past few years, and shows a gradual increase in output, although the last year, namely 1949, is somewhat distorted due to general coal mining labor conditions. However the wheel excavator is a special tool that is probably limited to a particular type of strata and where the right material can be found it certainly has great possibilities for economical and efficient removal of overburden.



Stripping overburden near Cuba, Ill.

How to Get More Footage Out of Hollow Drill Steel

Suggested Methods for Reducing Breakage—Alloy Steels and New Processes Promise Improvement

By C. W. DARBY
and
R. M. SIMPSON
Crucible Steel Company of America

REDUCING the cost of drill steel per ton of ore mined is a leading interest of the rock drilling and mining industries today. This interest has led these users of drill steels to ask the steelmaker these questions:

(1) How can hollow drill steel breakage be reduced?
(2) What are the advantages in using an alloy steel?
(3) Are better hollow drill steels in prospect?
(4) What practical research will develop better drill steel and improve rock drill rods?

This article will attempt to answer these questions. It brings up to date what has been done along these lines and also offers some new ideas on the application of drill steels.

Hollow drill steel breakage can be reduced by the user. This is indicated by the fact that two of the leading causes of breakage are poor drilling practices and general abuse. This applies particularly to the old reliable controlled carbon hollow drill steel which has been used for the past 25 years.

Most of the breakage of this steel occurs at either the shank or the bit end of the hollow drill rod. Premature failures can be expected when the steel is used in machines that are in poor repair. Also, breakage will occur with good machines improperly set up so that the drill rod is forced to perform the work of a flexible shaft. Correct drilling conditions will eliminate this type of failure.

Improper handling and abuse of the rod, resulting in damage to the surface, may cause breakage at any point on the drill. Drilling with dull bits, with too little air pressure, or with excessive air pressure, will result in inefficient operation and poor drill performance.

In many cases the wrong size bit or wrong bit design contributes to drill breakage. The remedy in this instance is to select the bit which tests or experience have shown to be correct for the drilling job.

Forging and Heat Treatment

Outside of breakage due to mishandling, most hollow drill steel failures are the result of improper forging and heat treating. When breakage occurs directly through the lugs or through the collar of a shank, overhaul of the forging operation will correct the difficulty. Correct forging procedure is common knowledge, but the operation needs close supervision in the shop.

Failures due to heat treatment are invariably fatigue failures occurring in the region of the rod where the forging, normalizing or hardening heat runs out. This is the so-called soft zone, but occurs naturally between the part where the rod is heated to the desired temperature and the part that remains cold. Between these two areas there must be a section where the critical temperature of the steel is not exceeded; the critical temperature being the lowest temperature from which the steel will harden on quenching.

Sub-critical temperatures tend only to soften the prior hardness of the steel. Maximum softness occurs when the temperature is held just under the critical point a sufficient length of time. Unfortunately, it is not possible to eliminate this soft zone because as soon as steel reaches a temperature just under its critical, and does not go over the critical temperature, it rapidly approaches its softest state and remains in that state even when quenched to room temperature.

However, the amount of softening can be minimized by limiting as much as possible the time the steel is held at the sub-critical temperature. This may be accomplished by allowing the end of the bar to be hardened to reach the proper temperature and holding long enough to heat through at that temperature. Just before quenching, the bar should be advanced into the furnace so that the portion which was just under the critical temperature will be taken over that temperature momentarily.

It must be quenched, however, before the heat travels down the steel to reach a new equilibrium temperature gradient near the furnace door, and begin a new zone of minimum hardness in the bar. The operation can be regulated by watching the color creep down the bar until it has passed the original run-out. At this point the bar should be quenched. This procedure prevents the part of the bar just under the critical temperature from softening by more than the least possible amount.

Fig. 1 shows the typical hardness gradient produced when a steel is not advanced before quenching. Compare with Fig. 2, which shows the effect of pushing the bar into the furnace four more inches a short time before quenching. Each curve illustrates the soft zone between maximum oil quenched hardness on the left and natural bar hardness on the right. Note that advancing the bar before quenching produces a much more gradual drop in hardness and not as low a minimum hardness.

All soft zones have two undesirable characteristics: First, that of being the weakest part of the bar by reason of low tensile strength, and second, that of acting as a stress raiser. The first is more widely known than the second, although the latter is at least as important as a cause of fatigue failure. In the field of machine design mechanical stress raisers such as notches, keyways, tool marks, holes, abrupt changes in section, etc., are well known. The action of these stress raisers is often referred to categorically as the "notch effect." Generally speaking, the sharper the notch the greater the stress raising effect. For example, a transverse chisel nick on a bar of steel makes it possible to break or crop off a length at the mark. The nick actually concentrates stress at the

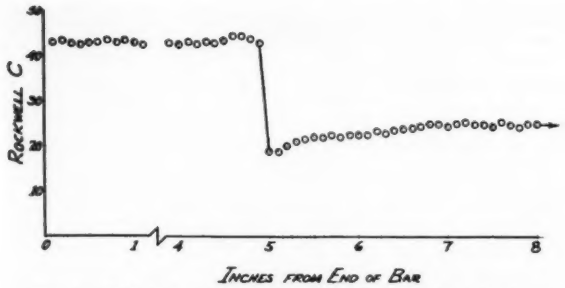


Fig. 1. Hardness gradient along one end of 1-in. hexagon carbon hollow drill bar, oil quenched from 1575 F. Total time in furnace—40 minutes. This end was not advanced before quenching. Arrow indicates natural bar hardness. Hardness readings taken 1/10 in. apart

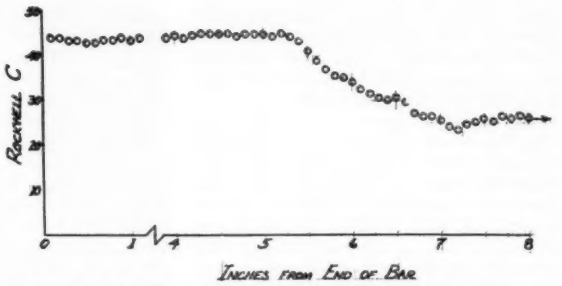


Fig. 2. Hardness gradient along opposite end of same bar used for Fig. 1. This end was oil quenched from 1575 F also, but it was advanced an additional 4 in. into the furnace about 2 minutes before quenching. Total time in furnace—42 minutes

bottom of the notch, so that instead of the calculated stress which would be in the smooth bar, there is a magnified stream at that point.

The behavior of a soft zone as a stress raiser has been established, and in this capacity has been called a "metallurgical notch" to distinguish it from an actual physical notch. The name is derived from the notched appearance of the hardness curve representing the soft zone, as shown by Figs. 1 and 2.

The fact that a soft zone like Fig. 2 resists fatigue failure longer than one like Fig. 1 is explained by the shape of the metallurgical notch. The effect is the same as that of mechanical stress raisers. A round-bottomed notch, simulated by the curve in Fig. 2, will not cause a bar to break from fatigue as rapidly as a sharp nick, simulated by Fig. 1.

New Heating Method

There is another technique that has produced excellent results in some cases of excessive breakage at shank or bit end of rods used under adverse conditions. Briefly stated, it consists of putting two soft zones in either end of the bar. To do this, the first hardening treatment should include one or two inches more of the bar than usual and the bar should be advanced before quenching, as described previously. After quenching, the bar should be reheated as before and the heat allowed to run out at a point one or two inches nearer the end of the bar. Fig. 3 shows the hardness gradient and double metallurgical notch produced by this technique. This hardening practice might be called a double quench. No normalizing treatment is necessary with this method because the first quenching operation after forging accomplishes the same thing as a normalize if only one hardening treatment is used. When the customary single quench treatment is given, the normalize must be included as a step between forging and hardening if maximum preference is to be achieved.

The reason for two soft zones is based upon the fact that a number of

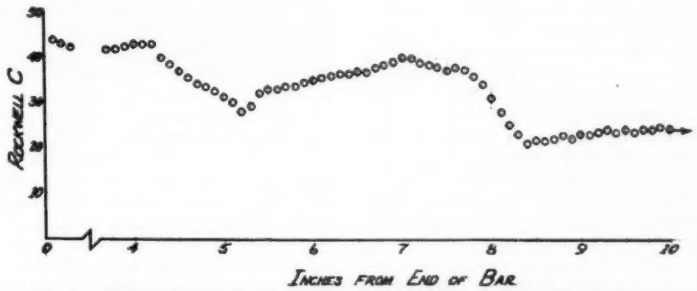


Fig. 3. Hardness gradient along the end of another piece of the same bar used for Figs. 1 and 2, but given a double oil quench from 1575 F. The notch on the right was produced by the first heat run out, the one on the left by the second

stress raisers close together is less harmful than one by itself. The presence of two notches redistributes the stress pattern in the fibers of metal involved, so that the peak stresses produced by a single notch are smoothed out by the presence of the second notch. As a consequence, the part will last longer by reason of lowered stress.

Alloy Steel Advantages

The first and probably chief advantage in using an alloy steel is its higher as-rolled hardness. This is a result of alloy steels having a higher hardenability than straight carbon steels. Consequently, the alloy steels finish with a higher hardness when subjected to the cooling rates associated with hot rolling. This higher hardness results in greater tensile strength, hence higher fatigue life inasmuch as fatigue failures are tensile failures. Higher hardness also eliminates a large part of the hazard of nicking or bending the drill rod in handling.

Because of higher hardness and greater tensile strength, the alloy steels have a higher yield strength, or elastic limit. This means that a bar may be bent or deflected farther than a straight carbon steel rod and still return to its original position. This factor is a decided advantage when drilling with heavy equipment under difficult conditions. However, this higher elastic limit must not be confused with stiffness, because stiffness

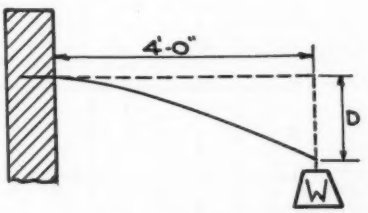


Fig. 4. Method of testing hollow drill bars loaded as a cantilever beam with a 4-ft lever arm. Load W in pounds plotted against deflection D is shown in Fig. 5

depends only on cross-sectional area, modulus of elasticity and length. Since carbon and alloy hollow drill steels have the same modulus of elasticity, there can be no connection between elastic limit and stiffness. An experiment based on a cantilever beam test can be conducted in any drill shop to prove this. By clamping one end of a bar in the drill sharpener and loading the other, as shown by the sketch in Fig. 4, the load can be plotted against the deflection as shown by Fig. 5. It is not necessary to go into the mathematics involved because inspection of the curves in Fig. 5 will clarify what happens. Stiffness simply means resistance to bending. It is perfectly clear that equal lengths of alloy or carbon drill steel of the same section bend exactly the same for a given load as shown by curves 1 and 2.

The only difference is that the alloy bar can be bent further than the carbon steel bar and spring back straight, since the alloy bar is harder and has a higher proportional limit.

Curve 3 represents a bar the same test length as 1 and 2, but of greater cross-section. It is carbon steel the same hardness as number 1 and has the same proportional limit. Obviously it is stiffer than the alloy bar, number 2, or, of course, carbon bar number 1. The only difference to account for this is cross-sectional area. An alloy bar of the same length and cross-section as number 3 would bear the same relation to it as curve 2 bears to curve 1.

The harder alloy rods give faster drilling speed than straight carbon drill rods used under the same conditions. This is due mostly to the higher proportional limit which is reflected in a more elastic impact between the drill piston and the drill steel. The harder, more elastic alloy bar transmits the piston blow more efficiently than does the straight carbon steel rod. This is readily apparent on block tests in the laboratory, where the harder alloy bars whip less than carbon rods and their rebound is more violent.

Balanced against these advantages of alloy steels are their higher cost and the requirement that they must be handled with more precise control in the fabricating shop. The greater control required in the shop is not an insurmountable problem. Temperatures judged by eye are not good enough. The best forging and hardening temperature ranges for alloys are narrower than for straight carbon steel. Therefore accurate pyrometer equipment is essential. As a rule it is not possible to get the best results by quenching for hardening. In some cases a simple air cool produces excellent results, but more often results are improved by using an intermediate cooling rate somewhere between that produced by still air cooling and oil quenching. This refers particularly to the deep hardening alloys which give full hardness on oil quenching. It is difficult but not impossible to arrive at the proper cooling rate because there is little choice in practical methods of doing this except to control the rate of air cooling. Fig. 6 illustrates a device which permits closely controlled air blast cooling. It is easily and inexpensively built, consisting of a large pipe manifold and a number of smaller pipe fittings welded in place to attach cooling jets. The U-tube manometer is made of two pieces of ordinary glass tubing, and permits reading air pressures in inches of water. The pressures required are small and a manometer is ideal for the purpose. With such a device, the same cooling conditions can be reproduced every time a batch of steel is ready for hardening.

Alloy hollow drill steel falls into two main groups: The low carbon and the high carbon types. The low carbon (e.g., less than 0.50 percent) alloys are usually fairly high in nickel, which

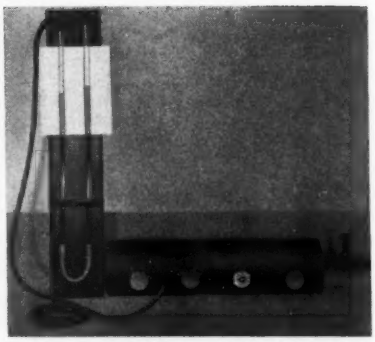


Fig. 6. Air blast quenching fixture for alloy hollow drill rods

with low carbon content gives exceptional toughness. The Park-A alloy grade typifies the first type of alloy and is essentially an 0.30 percent carbon steel with appreciable amounts of Mn, Ni, Cr, and Mo. The second type is represented by the 1 percent carbon, high-chrome moly steel supplied as the CA Double Diamond grade. A third type—and possibly the oldest—is a carbon-vanadium alloy of less hardenability than the others. Its chief advantages are that it can be heat treated exactly the same as regular carbon steel, yet it has the inherent advantage of higher as-rolled hardness. All three types have already demonstrated distinctive advantages, and development work is going on to find a still better all-purpose alloy steel.

Irrespective of the grade of alloy hollow drill rod used, the heating techniques already mentioned still apply. The soft zone which results from heating the ends for forging and hardening is developed just the same. If anything, some of the alloy steels are more notch sensitive—metallurgical or mechanical—than the controlled carbon steel, and abrupt changes in hardness should be carefully avoided.

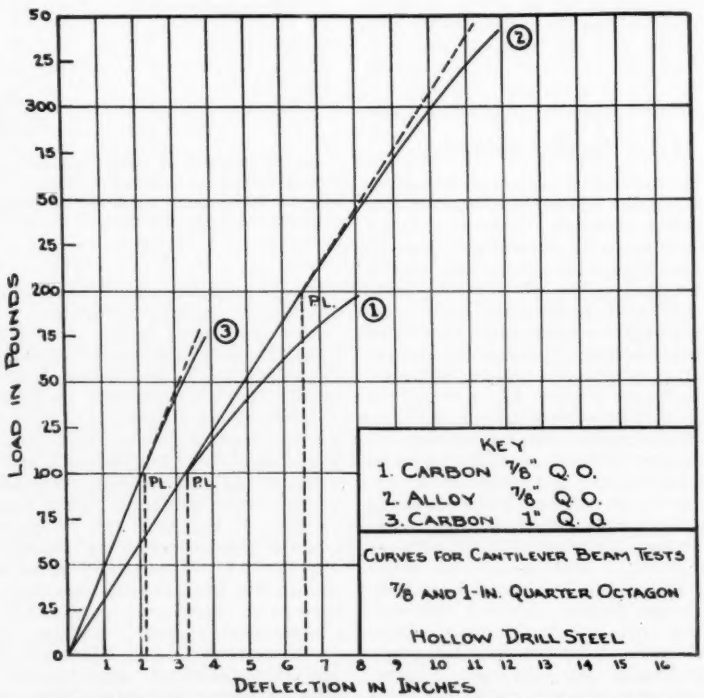


Fig. 5. Curves for cantilever beam tests 7/8 and 1-in. QO carbon and alloy hollow drill steel. The slope of the curve showing load vs. deflection represents the stiffness

Prospect for Better Drill Steels

There is no magic mix of alloys that will produce a finished hollow drill steel bar from the hot rolling mill that cannot be improved by further work on the rod itself. All of the conditions which adversely affect the old standby carbon steel also cause breakage of the newer alloy steels. The best hot rolled condition is not good enough. Steel improvements, such as skin removal, shot peening and surface hardening apply to both carbon and alloy steels alike. However, the steelmaker cannot undertake these improvements because their advantages are lost in fabrication. As soon as the rod is forged or heat treated, the benefit of surface grinding, shot peening or hardening is destroyed and the rods fail the same as they always have, in the heat-affected areas. Obviously, the

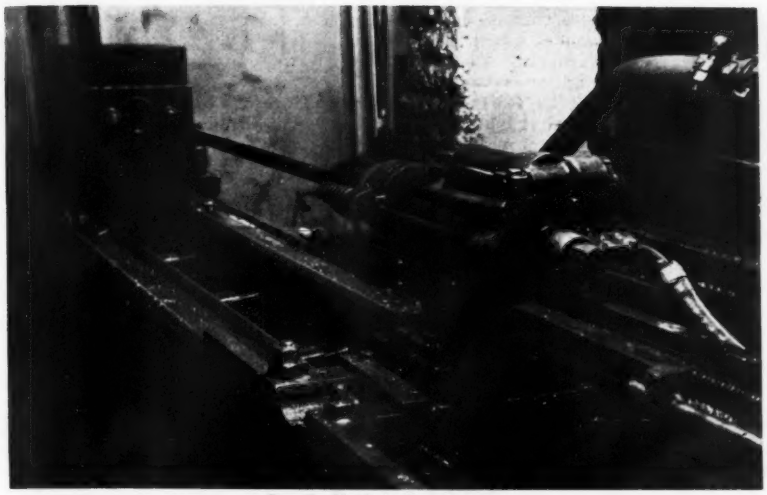


Fig. 7. Block test equipment

work must be done on the drill rod itself after the shank and bit attachments have been made.

At present, a search for the "super" rod is being conducted by extensive experimentation with treatments to current grades of alloy and carbon hollow drill steels, as well as basic metallurgical research. The results of some of these lines of research are highly promising and indicate what might be accomplished if someone should want to make a truly superior drill rod out of steels now in wide use.

Block Testing—When problems of drill steel life were first investigated years ago, it was discovered that while tensile tests, impact and various fatigue tests revealed a great deal about the different types of steel and what they would do after specific heat treatments, none of the usual laboratory tests had much bearing on drilling performance. After a great deal of investigation the present block test was chosen as most suitable for our purpose. The equipment for this accelerated fatigue test consists of a drifter secured to one end of a lathe bed with a heavy, forged block of steel bolted near the other end. See Fig. 7. A test bar is put in the drifter and allowed to drill against a replaceable anvil clamped to the steel block. Both ends of the test bar are cut square and are slightly chamfered but not heat treated. Thus, the test is actually conducted on the bar of hollow drill steel in its natural state. The drifter is run normally at a given air pressure until the bar breaks from fatigue. The block life of the bar is recorded in terms of the minutes required to break it. This result can be correlated with controlled rock drilling tests whenever a comparison of certain limited factors is desired. See Fig. 8.

This test was devised back in the days when a sand core was used to put the hole in hollow drill steel, and has since helped evaluate the many types and sizes of steels which have been developed. The block test revealed the importance of having a smooth hole through the bar when the switch from the sand core method of rolling was made. This early method consisted of boring a hole in a billet, filling it with sand and securely plugging the ends. As the billet was rolled down to bar size, the sand adjusted itself to each reduction and the hole was reduced in proportion. When the finished bar size was reached, the ends were cut off and the sand removed. The best that can be said for this bar was that it had a hole in it from end to end.

Today, the hole in the billet is filled with an austenitic steel insert and the assembly is rolled down like a solid billet. To extract the core, both ends of the drill steel bar are cracked and the insert is stretched on a draw bench. Being austenitic, the insert can be stretched enormously, and its cross-sectional area is reduced nearly proportionately over the entire length. When it is stretched small enough, the insert is snipped off and easily pulled out of the finished bar. The resulting hole wall is smooth and bears about the same relation to the old sand core hole wall as the surface of a cold drawn bar bears to that of a cast iron stove lid. The increase in block life of the smooth bore over the sand bore was over 100 percent, due to improvement of the surface of the hole.

The improvement in block life due to a smoother hole naturally suggested that more attention be paid to bettering the hot rolled surface on the outside of the bar. It was possible to reason that the hot rolled surface of the bar contained countless stress raisers caused by minute imperfections impossible to eliminate from hot rolling. Changes in rolling practice were quickly evaluated by the block test and many improvements have been made.

Centerless Grinding—Since improv-

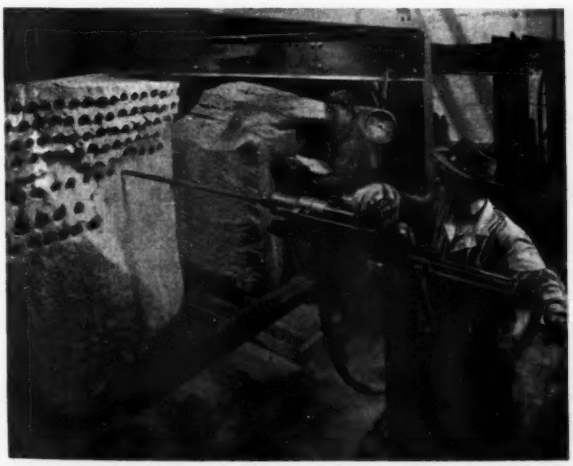


Fig. 8. (Left) Granite drilling test. Fig. 9. Straightening operation. This machine is used for hex and QO sections. Note reverse bending of bar passing through the rolls

ing the hot rolled surface produced appreciable gains in block life, it was decided to see what effect complete removal of the hot rolled surface would have. A bar of 1¼-in. round carbon hollow drill was taken out of stock, cut in half and one-half block tested just as it was. The other piece was centerless ground to remove all of the as-rolled surface. When this piece was block tested, it had a 600 percent longer life than the natural bar. Subsequent testing revealed that centerless ground bars gave uniformly improved results. Thus the premise was proved that a better surface would extend the life of hollow drill steel.

Shot Peening—Some time before shot peening was developed to improve the fatigue life of such things as torsion rods, coil springs, valve stems, crankshafts, etc., it was discovered that straightened bars of hollow drill steel frequently had a longer block life than unstraightened ones. Fig. 9 shows how hexagon and quarter octagon bars are straightened. It was evident that the cold work done in straightening was responsible. It was discovered later that the straightened bars were better because of a small residual compressive stress in the surface fibers of the steel. Attempts to duplicate this phenomenon by cold drawing were unsuccessful because a residual tensile stress was produced in the surface of the drawn bars. Since fatigue failures are tensile failures, the effect of cold drawing was to be avoided and the results of straightening duplicated.

Eventually shot peening suggested itself as a means of increasing the fatigue life of hollow drill steel. The peening work was conducted without any preliminary surface removal. Bars taken directly from stock and shot peened gained several hundred percent over the regular bar. This improvement in fatigue life corresponded closely with results published for shot peening of other highly stressed mechanical items, and proved that bar life could be extended by putting a residual compressive stress in the load carrying fibers extending several thousandths of an inch below the surface of the steel. Fig. 10 is a much enlarged photograph of a shot-peened surface. Notice the smoothness and uniformity of the indentations.

Heat Treating—Another line of investigation uncovered important facts about the effect of heat treating on the life of the hollow drill. It has been known for some time that paving breaker tools such as moil points or gads, asphalt chisels, etc., made of a carbon steel similar to the controlled carbon hollow drill grade have a much better life when heated and quenched all over in brine or water than when quenched all over in oil. The improvement is due to a hard uniform case about ⅛ in. deep surrounding a tough core. This means a case of approximately 60 Rockwell C, which closely approaches file hardness. (The natural hardness of regular carbon hollow drill steel is about 25 Rockwell C.) Since tensile strength varies as the hardness, the moil point with a surface hardness of 60 Rockwell C has a much higher tensile strength—hence higher tensile stress resistance—in the stress bearing layers of the steel than does the same bar in the natural condition of about 25 Rockwell C, or 40 Rockwell C in the oil quenched state. Moreover, formation of the fully hard case can produce a residual compressive stress near the surface. Since fatigue failures are tensile failures, the higher tensile strength of the water and brine quenched tools, plus any residual compressive stress which may accompany the treatment, accounts for their better resistance to fatigue.

However, it is not practical to water quench carbon hollow drill all over in a conventional manner, that is, by furnace heating and spray or tank quenching. The warpage is excessive and at a hardness of 60 Rockwell C it is impossible to straighten the rod. Controlled carbon hollow drill steel is made so that oil quenching will not

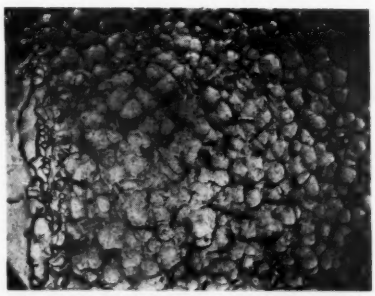


Fig. 10. Photograph of a shot-peened hollow drill bar showing indentations produced by No. 20 shot. Approximately 20 X

produce hardnesses much over 43 Rockwell C, so oil quenching will not produce the higher hardness that is indicated as desirable. However, another method was employed to get around the problems of controlling the hardened case depth and warpage.

A one-inch hexagon bar of five percent Ni carburizing steel was carburized just long enough to produce a case about 1/16 in. deep. This grade of steel had enough hardenability to produce full hardness by oil quenching, resulting in a high carbon case hardness of about 65 Rockwell C and a core of 42 RC. This piece was taken out of the quench hot enough to streighten, and when cold was tempered back to 59/60 RC so that it could be straightened what little more was necessary without cracking the case.

The fatigue life of the case hardened bar was about 6 to 7 times that of a regular straight carbon hollow drill steel. This substantial increase in life was obtained without any surface removal before or after carburizing. The effect of the case apparently by-passed any imperfections present in the as-rolled surface. The results of these case hardening tests clearly showed that surface hardening could be added to the list of things to do to drill rods to give them improved or superior qualities.

Again, it is obvious that none of these treatments could be given to drill steel by the maker because their benefits would be lost at either end of the finished drill rod after fabrication by the user.

Improvements Through Practical Research

In the preceding parts of this article we have recounted the steps taken to find out how to get longer life and superior performance from hollow drill steel. However, the equipment available to the steel maker to check his theories, for example, the block test and laboratory rock drilling tests, is too limited in scope to provide decisive answers. What the steel maker needs to compile authoritative data on steels and rods is the help of mining organizations to get a large variety of data on tool performance under actual mining operations. Likewise, the hollow drill steel user is not in a good position to try first this and then that grade of steel, groping for the particular steel that will do best in his operations. Information must be pooled in order to get results quickly and in the most economical manner.

In order to surpass present drill rod performance, the rod itself will have to be considered in a new light. It must be lifted out of the wrecking bar category. For instance, no manufacturer would think of taking an aircraft engine connecting rod forging, machining out the bearing surfaces, heat treating it and then putting it into service with the as-forged and heat treated surfaces. Aircraft engine parts operate under high stresses and consequently must be machined all over after forging and then honed to almost a mirror finish to remove stress raising tool marks. This same procedure is followed with many other severely stressed tool and machine parts.

Hollow drill steel falls in the same category as other highly stressed machine elements that are now given special treatment to get long life. The laboratory tests and field results that have been recounted point the direction that practical research should take. We suggest that all kinds of hollow drill rods be made up with the best forging practice that is now known and that all of the surface of the rods, either hot rolled or forged,

(*Continued on page* 83)

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Size, in.	*Plies*	*Approximate O. D., in.*	*Recommended W. P, lbs.*
½	2-braid Ustex	15/16	350
¾	2-braid Ustex	1 13/64	350
1	2-cord Ustex	1 21/32	300
1¼	3-braid cotton	1 15/16	300
1½	3-braid cotton	2¼	250
2	3-braid cotton	2¾	250
2½	7-ply Duck	3 31/64	225
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Size, in.	*Rayon Braids*	*Approximate O. D., in.*	*Recommended W. P., lbs.*
½	2	57/64	200
¾	2	1 5/32	200
1	2	1 15/32	200

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Mechanical Labor Saving Devices for the Assay Office

Convenient Equipment Speeds Up Analytical Processes

By L. A. CREGLOW

Director, Research Laboratory
United States Smelting Refining and Mining Company

THE mechanical or "gang" filter rack developed in the research laboratory of the U. S. Smelting Refining & Mining Co. consists of a conventional rack for holding the filtering funnels to which is attached a tilting frame that carries the beakers. Beakers are handled in groups of six by means of a simple punched tray. Thus, in such operations as placing beakers on or removing them from the hot plate, six beakers are handled as one.

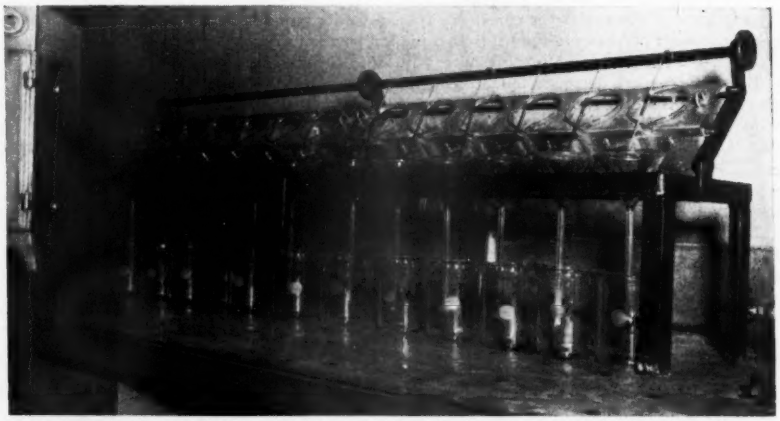
When the operations have progressed to the point of filtering, two trays, each with six beakers, are placed on the tilting frame of the filter rack. The small pouring rods, attached in line to a rotating rod, are turned down onto the lips of the beakers and clamped in place by a lock nut. The assembly of 12 beakers is then tilted by turning a worm meshed with a gear cut on the end of the center cross member of the tilting frame, until the solutions flow down the pouring rods onto the filters.

When the filters are filled with solution, tilting of the beakers is stopped until more solution can be poured onto the filters. When all the solution has passed through the filters, the beakers are tilted to the point where the precipitate or residue can be washed out with a jet of water. The empty beakers are then returned to an upright position, the pouring rods unclamped, and the trays of beakers lifted from the rack which is then ready for another set of beakers.

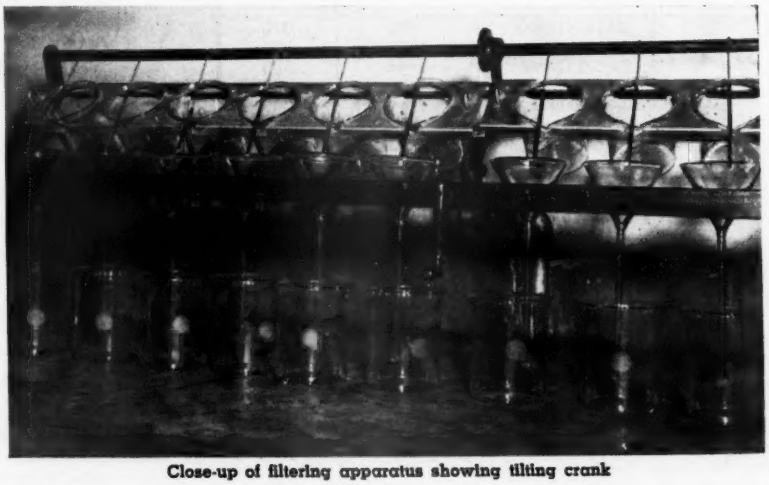
One man operating six racks passes from one rack to the next, increasing the tilt of the beakers on each pass to keep the filters well filled with solution. In this manner, he can filter 72 beakers in not much more time than was required to filter six by the old hand method. The actual effort involved in the process, including the placing of the trays of beakers on the rack, appears to be appreciably less than the ratio of one for the mechanical filter to 12 for the hand method.

The success of the mechanical filtering device depended upon the practical development of three elements of the apparatus. The most puzzling was the method of holding the beakers. Several awkward arrangements of rings attached rigidly to the tilting frame were tried before it was discovered that a simple, portable sheet metal tray for holding the beakers solved the problem. Holes with notches to accommodate the beaker lips were punched in a strip of stainless steel sheet and the edges bent over 3/16-in. stainless steel rods by means of a forming die. In this way a rigid, lightweight tray for transporting and holding beakers on the filter rack can be made from 20-gauge sheet.

Other elements that contributed to the success of the apparatus were the method of operating the pouring rods as a gang of 12 to avoid individual locking of each rod, and the arrangement for tilting the beakers. The latter was accomplished by cutting a gear on the front end of the center cross member of the tilting frame. This gear is meshed with a worm placed at the center of the rack holding the funnels and is operated by a



General view of filtering apparatus showing beakers in a partially tilted position

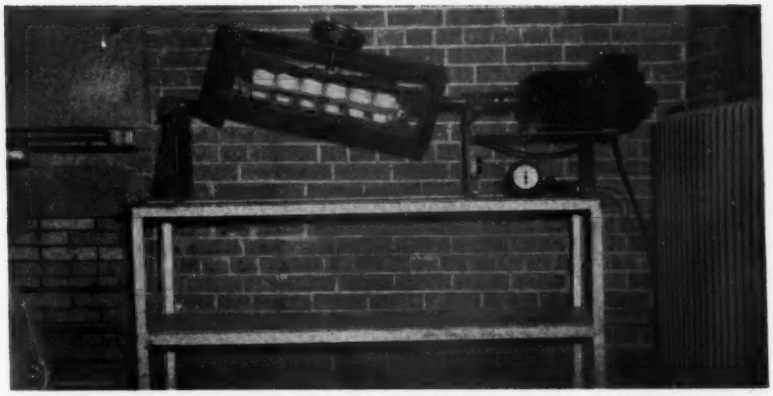


Close-up of filtering apparatus showing tilting crank

hand crank at the front edge of the rack. Simply turning the crank tilts the beakers into pouring position or lowers them.

Either 250-cc or 400-cc beakers can be used on the 18 racks in service at the Midvale assay office. Trays have been made to take these two sizes of beakers and all trays fit the tilting frame of all the filter racks. In fact, six 250-cc and six 400-cc beakers may be filtered at the same time on a single rack. Filter racks can be made to take almost any size of beaker. However, it is not practical to build a rack on which beakers of widely differing sizes can be filtered, since the spacing of the funnels and pouring rods must be controlled by the size of the largest beakers and, consequently, only a few small beakers can be filtered on a rack built for large beakers. All of the racks have been built to take 12 beakers, but they may be constructed to handle any reasonable number.

Application has been made for a patent to cover the filtering apparatus.



Front view of fire assay charge mixer showing the crucible holder in upright position

Unusual ingenuity led to the development of the "gang" filter rack, multiple flux dispenser and the assay charge mixer described here. The same type of thinking that resulted in these helpful innovations could well be applied to other repetitive steps performed by the mining industry.

Fire Assay Flux Dispenser

No great effort is involved in charging flux to assay crucibles and it probably is not worth while to attempt mechanization of this operation merely to reduce the work. However, hand charging of flux into the crucibles inevitably causes a dusty condition which is rather difficult to control. It was thought that if the flux could be dispensed mechanically into a number of crucibles simultaneously, the dust arising from the operation might be entirely eliminated by a simple ventilating system.

The dispenser developed at Midvale consists simply of a flux bin with a 2-in. cast iron bottom in which 1⅝-in. holes have been drilled at the same spacing as the holes in the crucible trays (each tray holds 18 crucibles in three rows of six each). The diameter of the holes is dictated by the volume of flux required in a standard assay charge. Above and below the bottom plate are steel slide plates with holes of the same diameter and spacing as in the cast iron bottom. Each slide is operated longitudinally by means of levers. In order to keep the flux from packing, four longitudinal bars are attached to the inside of the bin having fingers which project downward to within ½ in. of the top slide. This prevents vertical cylindrical channels from forming in the flux above each charge hole, which results in uneven filling of the holes.

About 300 lb of pre-mixed flux are placed in the bin of the dispenser. A tray of empty crucibles is placed under the dispenser. With the lower slide in the closed position, the upper slide is moved to the open position to allow the holes in the bottom plate to fill with flux, and is then closed. The bottom slide is moved to open the holes, thus allowing the flux charges to fall into the crucibles. The space beneath the dispenser in which the tray of crucibles is placed is open only at the front side. A ventilating duct may be placed at the back side to remove any dust arising when the charges fall into the crucibles.

When the 18 crucibles in a tray have been charged with flux, the remaining operations consist only of weighing out the ore pulps and placing the tray of crucibles in the charge mixer which is rotated for two minutes. Then the crucibles are ready to be placed in the furnace.

Fire Assay Charge Mixer

Spatulas are generally used to mix ore and fluxes and a skilled assayer can perform this operation with fascinating dexterity. But the time and labor involved in mixing several hundred assay charges per day is considerable.

Experiments conducted by Prof. O. C. Shepard of Stanford University, in which he showed that heterogeneous powders can be efficiently mixed by shaking them for a surprisingly short time in any convenient closed container, led to mechanization of this operation. This being the case, all that remained for the mechanical mixing of assay charges was to find some practical way of keeping the charge within the crucible while it was being shaken. Some experimenting demonstrated that a sheet of sponge rubber pressed on the top of the crucible effectively retained the assay charge even when the rim of the crucible is uneven.

The apparatus that was finally developed consists of a rectangular steel box without sides; that is, with only a bottom and ends. Trunnions were welded to opposite corners of each end so that the frame may be turned in a manner similar to the ordinary tumbling mixer. A top, consisting of a steel plate with a sheet of 1-in. sponge rubber cemented to the bottom side, is mounted on guides and is moved up and down by means of a screw with a hand wheel. The trunnions turn in pillow-block bearings mounted on brackets rising from the base plate of the apparatus. The box is rotated at 38 rpm through a gear reducer directly connected to the end of one trunnion.

Crucibles for assay fusions are handled in groups of 18 on a board tray having three rows of six holes each in which the crucibles are placed. When all the crucibles have been charged with flux and ore, the tray of crucibles is slipped along guides on the bottom plate of the tumbling box until centered beneath the top plate. The top plate with the sponge rubber sheet is then pressed down on the tops of the crucibles by a few turns of the hand wheel. The motor is started and the set of crucibles rotated with a tumbling motion for two minutes, when a timer turns off the motor. The top plate is then raised and the tray of crucibles removed from the mixer. The crucibles are then ready to be placed in the furnace.

No application for patent has been made for either the flux dispenser or the charge mixer.

Rotary Rigs Drill Blast Holes

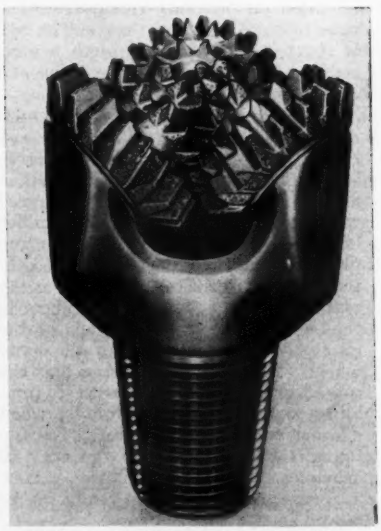
Unusual Drilling Speeds Obtained in Dry-Drilling Dense Materials

By R. E. KINTER
Joy Mfg. Co.

A NEW development in blast-hole drilling is a rotary-type drill designed to utilize roller-cone type bits for drilling and compressed air for removal of cuttings. The rotary principle of rock drilling has been proved in the oil fields over many years of service and the hydraulic feed rotary drill has advanced rapidly within the past few years with the development of the modern roller cone rock bit.

Experimental work which led to the new drill began five years ago with an early model designed for the maximum bit pressures then recommended by bit manufacturers. The drill itself was similar to portable oil field drill rigs. It was mounted on crawler treads, powered by two gasoline or Diesel engines or two electric motors, and had a rotary table placed near the rear of the machine. Water, circulated by means of a mud pump, washed the cuttings away from the face of the bit and out of the hole.

This original drill proved successful in field tests in limestone formations, and a number of units were installed in various quarries throughout the country. However, difficulty arose with securing maximum results when drilling in dense, hard rock. This prompted intense research and resulted in the construction of new tri-cone bits capable of drilling these harder formations. These new bits and the harder formations made greater bit pressures necessary.



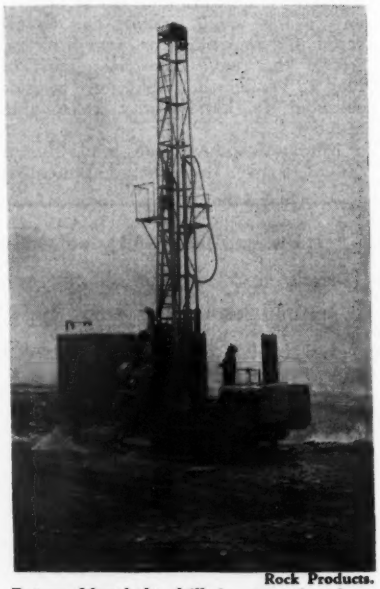
Tri-Cone rock bit for use in rotary blast-hole drilling. Different arrangements of teeth are used for drilling in formations of different densities and hardnesses

Water requirements for wet drilling often presented problems including development of an adequate supply, costly lines to deliver water to the drill, water disposal, and freezing hazards under severe weather conditions. Freeze-ups often caused complete quarry shutdowns for long periods of time. These difficulties seriously interfered with the application of the rotary drilling principle. Investigation determined that removal of cuttings by water was only partially effective since eddy currents prevented free ejection of the cuttings and caused considerable regrinding. It was frequently impractical to furnish a sufficient volume of water to carry away the large pieces of rock which were broken off. These large pieces, which had to be reground before the water could wash them away, greatly reduced drilling efficiency.

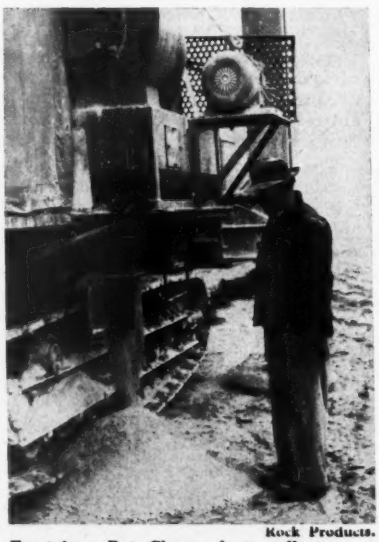
Substitution of compressed air for water as a hole cleaning medium was discovered to be the answer to these problems. This system also called for a new tri-cone bit designed with proper air jets to direct the flow of air to the periphery of the hole. Field tests of a drill equipped with air cleaning facilities revealed that drilling speed was increased through complete cleaning of the hole and bit life was much longer.

Armed with the results of nearly five years research and development, and aided by actual field experience, engineers were now ready to design a production drill. The machine was made heavier than its predecessor and the design was improved. The rotary table was placed in the center of the machine so that the entire weight of the machine was utilized. Thus, bit pressures as high as 30,000 lb could be exerted. An air compressor, mounted at one end of the drill, supplies air in sufficient volume to remove all cuttings from the face of the bit and also serves to keep the bit cool during drilling. These design advancements have been field tested with interesting results:

(1) Regrinding of chips is elimi-



Rock Products.
Rotary blast-hole drill in operation in a dolomitic limestone quarry



Rock Products.
Emptying Roto-Clone dust collector on rotary drill

nated and the greater effectiveness of the roller cone bit results in faster penetration and reduced bit cost.

(2) In a hard, dense dolomite quarry in Michigan over a two-year period a rotary drill, using water for removal of cuttings, averaged 6 ft per hour. During one season of operation (3-4 months) a heavier rotary drill, using water for removal of cuttings, averaged 12 ft per hour. Experimental work with an improvised arrangement for removal of cuttings by air has resulted in an average drilling progress of 20 ft per hour.

(3) In a medium hard limestone quarry in Michigan the rotary drill, over a two-season period with removal of cuttings by water, averaged 24 ft per hour. Using air for removal of cuttings, this drill has averaged 38 ft per hour over a two-month period.

Probably the most important advantage arising from the use of compressed air for cleaning the hole was elimination of the difficulties of water supply, disposal and freezing that hamper water-equipped drill rigs.

The 42,000-lb Heavyweight Champion, designed to incorporate these drilling advantages, is self-propelled on crawler treads for rapid movement from hole to hole and to different locations. Tramming speeds range from one to five miles per hour. Three centrally controlled hydraulic jacks level the drill quickly. The 30- or 40-ft mast which is raised and lowered hydraulically may be left in the upright position while tramming over relatively smooth ground. Air is supplied by a compressor mounted on the drill. A "Roto-Clone" dust collector traps and collects the cuttings at the surface, and these are available as tamping powder. The unit will drill up to a 7⅞-in. hole to any quarrying depth required.

A lighter drill, the Middleweight Champion, replaces the original rotary blast-hole drill and weighs 35,000 lb. It is self-propelled, and is mounted on crawler treads. Tramming speeds range from one to seven miles per hour. Leveling is accomplished by the use of two screw jacks. Rated capacity is a 6¼-in. hole to any quarrying depth required. Where drilling conditions make necessary the use of water for removal of cuttings, either drill may be equipped with a mud pump for circulation.

More Footage Out of Hollow Drill Steel

(*Continued from page* 78)

be removed by careful grinding. Then the rod should be heat treated all over to produce a uniform hard case of high tensile strength to carry the major stresses.

This skin hardening can be accomplished in any one of several ways. One would be to carburize the entire rod to produce a uniform case of high carbon content to harden on quenching. The depth of this layer should be varied to determine the optimum case to give the best fatigue life in a particular kind of drill rod. A second method would be to employ flame hardening.

By using flame hardening and controlling the time of exposure to the high temperature of oxyacetelene torches, it is possible to control the depth of hardened case. A third method, and perhaps the most adaptable, would be induction heating. Either flame or induction heating accomplished case hardening by heating only as much steel above its critical temperature as should be hardened on quenching. These methods are especially attractive because they are attended by a minimum of warpage and the finished bars require little or no subsequent straightening.

A fourth and interesting approach would be to nitride the entire surface of the bar. Nitriding would follow an over-all heat treatment or possibly just an over-all skin hardening. Of course, a nitriding grade of steel would have to be used, but there is no obvious reason why some of the well-known nitriding steels would not make excellent alloy hollow drill rods. Nitriding produces a high hardness up to a depth of about .020 in. without requiring excessively long exposure to an atmosphere of cracked ammonia, which is the source of nitrogen. The hardness obtained this way is much greater than that which can be produced just by quenching. Its advantage would show up on the bit attachment end which would permit many more bits to be changed before the connection would have to be replaced. Another probable advantage would be that nitriding would harden the hole wall as well.

The effect of shot peening applied to the skin hardened and tempered bar should also be investigated. Laboratory tests have shown that it improves the fatigue resistance of hardened bars.

If experiments in the field along these lines could be started, it would become clear just what the steel makers should do to furnish the required grades of hollow drill steels. The results of such research would also substantiate the premise that there is no magic alloy of steel to end all drill problems. Such a program would also reveal that certain shank and bit ends lend themselves to a particular processing better than others.

A trend toward simplicity in the rod design should minimize the costs of machining and heat treating. This means that the easiest section of drill steel and the simplest shank and bit connection to finish all over probably would be the one adopted, provided certain drilling advantages were not lost. The bit connection of the rod should be the least worry of all inasmuch as it is the only part of a hollow drill rod that already is machined and left in a suitable condition for high performance. There might be some shank design changes because the shanks we are using today are the same as they were when the first hollow drill was made more than a quarter of a century ago.

Also, there could be some investigation concerning the best section to be used for hollow drill steel. It may be that the hex, round and quarter-octagon sections which have been standard since the first hollow drill steel was made, may be changed to different shapes or different standard sizes. Some consideration should be given to the matter of optimum drill steel rod lengths. For example, it may be that under certain conditions and with certain equipment, the lengths of rods used should be varied. This view is based on the assumption that certain resonant frequencies may be set up in certain rods which are only a few inches different in length, from others which could drill the same depth of hole. It is suspected that resonance can produce vibrations in a bar which do nothing but shake the steel to pieces without accomplishing any useful work.

Such research as suggested here will probably make the drill rod cost more than it does now. However, the increases in service life that have been indicated promise to nullify the extra cost. In some cases the improvements obtained would undoubtedly justify a good deal of extra cost. In a way, this situation of the drill steel keeping up with the drilling equipment is like the race between armor-piercing projectiles and armor plate. Carbide bits perform so well and pneumatic hammers hit so hard that the drill rod now comes in for most of the criticism. It appears that the "projectiles" are ahead of the armor plate.

Alloys and handling techniques have been developed to meet this increased abuse although hollow drill steel sections have not been increased in 25 years while the power they have to absorb has been tripled. Since the steel maker cannot follow his "armor plate" into the field and apply the results of his laboratory work, the hollow drill steel users will have to participate actively if they are to benefit from the knowledge now available. Our assistance in solving this mutual problem is pledged.

See Convention Reports

OCTOBER ISSUE

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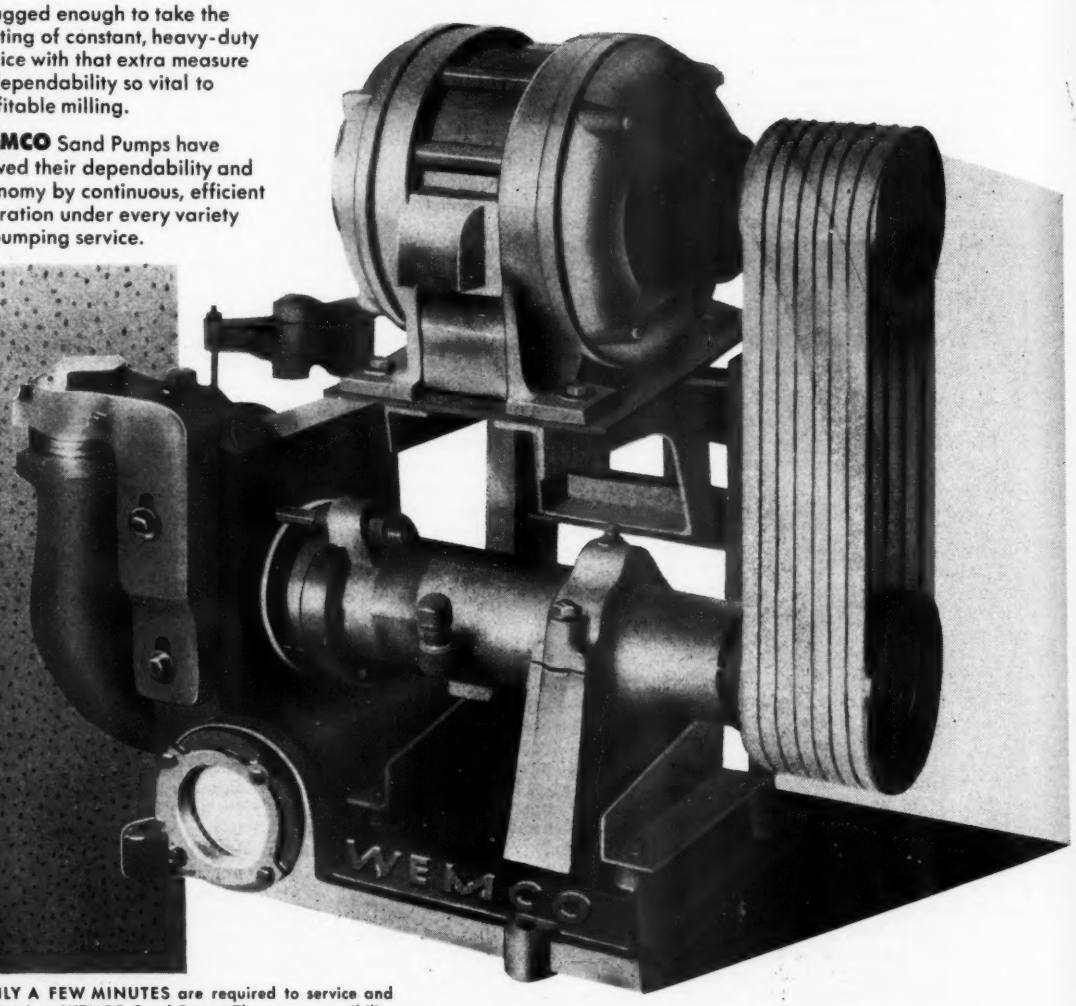

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Wheels of GOVERNMENT

AMC

As Viewed by A. W. DICKINSON of the American Mining Congress

THE serious aspect of the international situation is keeping Congress' nose to the grindstone in a drive to give the Administration economic controls, money, and broadened authority to provide troops and armament for whatever the eventualities may demand. The "delayed action" Revenue Bill now appears scheduled for quick handling, shorn of its $1,000,000,000 excise tax revenue loss feature, and now designed to bring in $5,000,000,000 toward the emergency financing. Late in August Congress may begin a series of recesses, but adjournment until January 1951 now seems out-the-window.

Taxation

On the last day of the Senate Finance Committee hearings (July 13) on the Revenue Bill, discussed in the July JOURNAL, Administration leaders called a halt in committee consideration of the measure pending developments in the national emergency. On July 25 the President called upon Committee Chairman George to revise the bill, eliminating the excise tax reductions and other "revenue-losing provisions" and raising an additional $5 billion a year through increased income taxation. The White House called for immediate action to increase the corporate "normal tax" rate on corporations from the 21 percent in the House bill to 25 percent, with a "surtax" of 20 percent on income in excess of $25,000. This would raise the basic tax rate on income above $25,000 from the present 38 percent rate to 45 percent—an increase of something more than 18 percent of the present tax. The request called for individual income tax rates to be rolled back to 1945 levels, to become effective October 1, 1950. Restoration of the excess profits tax is also in the offing.

Meanwhile, the House Committee on Ways and Means is considering a new renegotiation of contracts bill by Representative Vinson (Dem., Ga.) prepared by the National Security Resources Board. This measure would cover all contracts made by the Government in connection with the national defense effort and would replace current law, extended by reference in appropriation acts since the war, under which producers of raw materials have been exempt from the renegotiation of their contracts. This exemption includes: "Any contract, or subcontract, for the products of a mine, oil or gas well, or other mineral or natural deposit, or timber, which has not been processed or refined, or treated beyond the first form or state suitable for industrial use." This language is not in the Vinson bill, which includes raw materials at all stages, and has only a general provision authorizing the Board to make such exemptions as it considers called for.

In presenting the viewpoint of the mining industry on the House-passed Revenue Bill to the Finance Committee on July 12, AMC Tax Committee Chairman Henry B. Fernald attacked the proposals that would: (1) provide that abandonment of capital assets or of property used in the trade or business shall be considered as a sale or exchange of property; and (2) classify losses from sale or exchange of depreciable or real property used in the trade or business as capital losses, deductible only from capital gains. He called for retention of the 10 percent percentage depletion rate for coal and vigorously opposed the proposal to eliminate costs of transportation from the mine to the treatment plant in determining "gross income from the property" for computing percentage depletion.

M. D. Harbaugh, vice-president, Lake Superior Iron Ore Association; S. H. Williston, chairman, Tax Committee, Mining & Metallurgical Society of America; and James W. Haley, vice-president, Jewell Ridge Coal Corp., testified in support of the points raised by Mr. Fernald.

Economic Controls

In his July 19 message to Congress on the Korean crisis the President called for (1) removal of statutory limits on the sizes of our armed forces; (2) provision of funds for the foreign arms program; (3) legislation authorities and allocate materials, to limit the use of materials for non-essential purposes, to prevent inventory hoarding, and to requisition supplies and materials needed for the national defense; (4) adoption of general measures "to compensate for the growth of demand caused by the expansion of military programs in a period of high civilian incomes"; (5) control of consumer credit and credit used for commodity speculation; and (6) authorization for production loan guaranties, loans to increase production, and long-term contracts and other means to encourage production of certain materials in short supply.

The "Defense Production Act of 1950" was immediately introduced in both Houses to implement the White House request. Quick passage is anticipated, including price and possibly even wage controls.

Section 303 of this Act is particularly interesting to mining in that it reads: "(a) To assist in carrying out the objectives of this Act, the President may make provision for purchases of or commitments to purchase metals, minerals and other raw materials, including liquid fuels, for Government use or for resale.

"(b) Purchases and commitments to purchase and sales under subsec-

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Washington Highlights

CONGRESS: Held over by National Emergency.

TAX: Bill revised for war.

CONTROLS: Will be granted President.

SOCIAL SECURITY: Conferees agree.

STOCKPILING: Funds increased.

INCENTIVE PAYMENTS: New O'Mahoney bill reported.

FUELS: To be studied.

★ ★ ★ ★ ★ ★ ★

tion (a) may be made without regard to the limitations of existing law, for such quantities, and on such terms and conditions, including advance payments, and for such periods, as the President deems necessary, except that purchases or commitments to purchase involving higher than currently prevailing market prices or anticipated loss on resale shall not be made unless it is determined that supply of the materials could not be effectively increased at lower prices or on terms more favorable to the Government, or that such purchases are necessary to assure the availability to the United States of overseas supplies.

"(c) The procurement power granted to the President shall include the power to transport and store, and have processed and refined any materials procured under this section."

Social Security

On August 1 Senate-House conferees agreed to report the Social Security bill, H. R. 6000, although there appears to be trouble ahead on the House floor over the Knowland (Rep., Calif.) amendment, which would bar the Secretary of Labor from cutting off unemployment compensation funds from a state until judicial review has established whether state actions conform to Federal law.

The bill as reported to the House and Senate carries the Senate common-law definition of the term "employe," thus excluding mine lessees as independent contractors. Included as employes under the definition are full-time life insurance salesmen and certain types of agent-drivers and commission-drivers, wholesale salesmen and manufacturers' agents, and industrial home workers.

The present social security tax on employes and employers is frozen at 1½ percent each until January 1, 1954, but the amount of annual earnings on which taxes would be paid is raised from $3,000 to $3,600. From January 1, 1954, to January 1, 1960, the tax rate would be 2 percent each on employe and employer; from 1960 through 1964 it would be 2½ percent on each; from 1965 through 1969 it would be 3 percent on each; and thereafter 3¼ percent on each.

Stockpiling

Prompted by the national emergency, the President on July 28 asked Congress for an additional $600,000,000 for stockpile purchases, stating that his request is in addition to the $500,000,000 for new obligational authority for the stockpiling program which he recommended in the 1951 budget.

The "omnibus" appropriation bill, now under debate on the Senate floor and slated for early enactment, provides $605,000,000 for stockpiling of critical and strategic materials for the fiscal year 1950, but increases from $100,000,000 to $125,000,000 the contract authorizations for such purchases.

The Senate Appropriations Committee removed from the House-approved bill a limitation of $25,000,000 on domestic purchases, stating that such a limitation contravenes the "buy American" policy promulgated in 1933.

The committee report states that: "The policy of Congress in enacting the Stockpiling Act was to encourage the development of strategic and critical materials in the United States in order that in time of crisis we should not be dependent upon foreign sources of supply. The General Services Administration has authority of law to make advance payments on domestic contracts and it is the belief of this committee in view of the stated policy of the Congress that the limitation imposed by this language should not exist, but that the General Services Administration should be free to acquire strategic and critical materials within the United States. A limitation of this character might easily arise to plague the national defense program during fiscal year 1951."

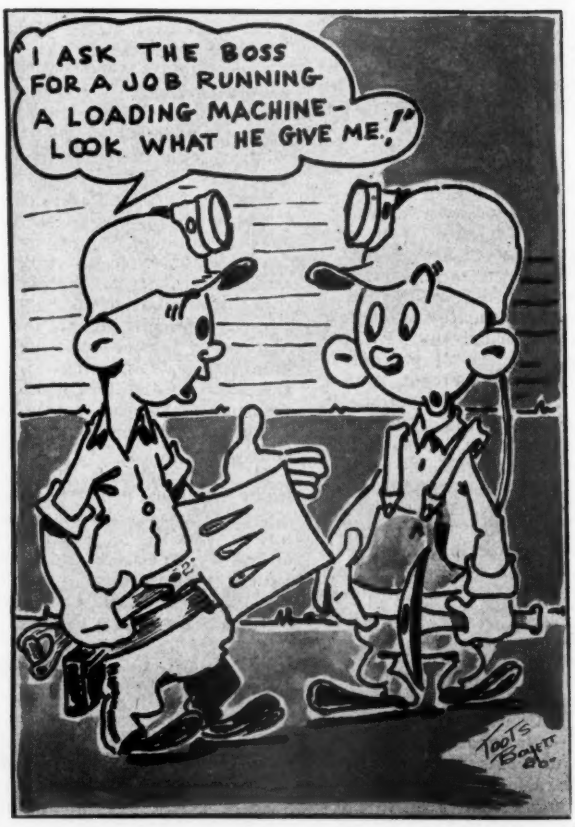
Meanwhile the House on July 17 passed H. J. Res. 502, continuing for another year, until June 30, 1951, the suspension of the 2¢ a pound import tax on copper. This measure is now under consideration in the Senate Finance Committee, which held brief hearings on July 27 at which Senators Malone (Rep., Nev.), McFarland and Hayden (Dems., Ariz.), and Rep. Baring (Dem., Nev.) appeared in opposition.

Mine Incentives

A new O'Mahoney (Dem., Wyo.) mine incentive bill, S. 3972, was reported to the Senate July 25 by the Committee on Interior and Insular Affairs. Designed to stimulate exploration for and conservation of strategic and critical ores, metals, and minerals, the bill is practically identical with the original O'Mahoney bill S. 2105, which failed of House passage by a margin of 22 votes. The new bill differs from S. 2105, as amended by the House Public Lands Committee, in that it carries the Cordon (Rep., Ore.) amendment providing that all contracts covering exploration projects are to contain provisions for repayment to the Government of sums advanced by the U. S.—the liability for repayment being limited to payment of a reasonable portion of the profits that may accrue from production as a result of the exploration.

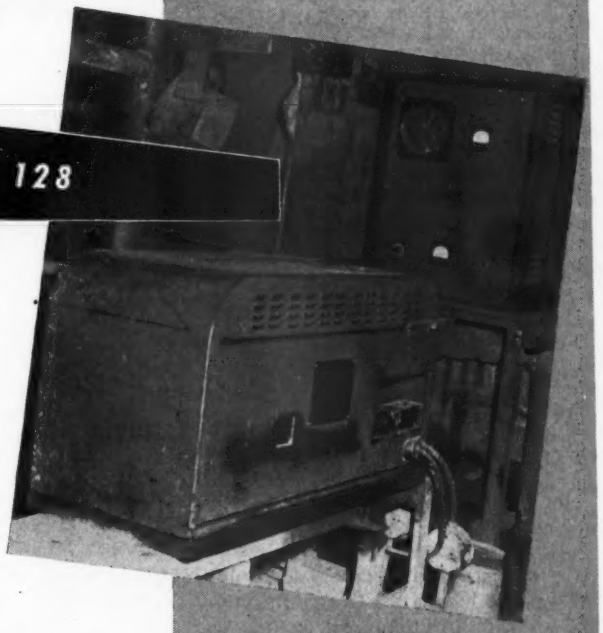
O'Mahoney's new bill also contains the provisions inserted by the House Public Lands Committee calling for

(*Continued on page 104*)



SEE THE MASSCO *Circuitron*

BOOTH NUMBER 128



At the Salt Lake Mining Show you will see the Circuitron, a sensitive mechanism for determining and controlling proper feed rate for optimum closed circuit grinding. The electronic device takes into account both the grinding mill load and the classifier sand load, greatly simplifying mill operation.

Other world famous equipment manufactured by Mine & Smelter for the mining industry includes: Marcy ball, rod and tube mills, Wilfley concentrating tables, Massco-Fahrenwald flotation machines, Massco-Grigsby rubber pinch valves, Massco Gy-Roll laboratory reduction crushers, rock bit grinders and hot millers, density controllers, Massco-McCool laboratory pulverizers and Massco crushers, belt feeders.

Through its territorial offices Mine & Smelter is also a jobber of outstanding lines of mine and mill machinery, electrical equipment and supplies, chemical, assay and laboratory supplies and equipment, industrial supplies, and equipment for complete milling plants. Ask for MASSCO literature on all your requirements.

Representatives: Canadian Vickers, Ltd., Montreal; W. R. Judson, Santiago and Lima; The Edward J. Nell Co., Manila, P.I.; The Ore & Chemical Co., 80 Broad St., New York 4, N.Y., for Continental Europe.

THE *Mine & Smelter* SUPPLY COMPANY

Main Office:
Denver, Colo., U.S.A.
El Paso; Salt Lake City;
1775 Broadway,
New York, N.Y.

A REPORT
ON MINE HAULAGE SAFETY
FROM G. K. McKEE, PRESIDENT, THE ELRECO CORPORATION

Many of you have heard about—and some of you have probably seen—the new Elreco Inverted Trolley, which completely eliminates trolley poles and nips.

Thanks to this revolutionary, new development, mine operators will soon have available a far safer method of getting power from the trolley to all mobile equipment. Conversion will be easy, speedy, low in cost.

Recent official studies made in an important coal-producing state show that 18% of mine haulage fatalities are caused by trolley poles and nipping. By doing away with poles and and hand nipping, the Elreco Inverted Trolley makes it possible for operators to give full attention to controllers, brake-wheels and sand levers. Particularly advantageous when operating in low coal, the slide always follows the locomotive travelling in either direction without attention from the operator. When locomotives leave the trolley for gathering, the sliding shoe stays on the wire, and without any manipulation from the operator, fulfills the same purpose as the conventional nip.

The new Elreco Inverted Trolley replaces the conventional pole and collector with a sliding shoe which rides on top of the wire. To the shoe is attached an arm and a fuse. The whole assembly is connected to a trailing cable which serves both to pull the shoe along and to carry current from trolley wire to equipment. The arm is pinned to allow free swing according to the direction of travel.

Thus, the hazard in operating electrical haulage equipment is reduced to a minimum. The operator no longer has to back-pole, reverse his pole, or handle nips. At the same time, equipment maintenance is materially reduced by the elimination of shock to motors, gears, etc. that comes from breaking and making contact under power. Arcing, also an important factor from the standpoint of safety and maintenance — is reduced an estimated 90% over the conventional method.

The Elreco Inverted Trolley has been thoroughly tested in the Cannelton Coal and Coke Company's Lady Dunn Mine No. 100 at Cannelton, West Virginia. It has been in continuous operation for the past five months and has proved extremely successful. This test has encouraged us to put the Inverted Trolley on a production basis. We expect that it will be ready in the very near future for the many of you who have written and requested information.

Working models of the Elreco Inverted Trolley will be on display August 16 through 19—Southern Appalachian Industrial Exhibit, Bluefield, West Virginia—Booth No. D-21.

August 28 through 31—Metal Mining Convention and Exposition, Salt Lake City, Utah, Booth 156.

September 25 through 27—Mining Electrical Group, West Frankfort, Illinois.

For further information write me personally c/o Elreco, 2900 Cormany Avenue, Cincinnati 25, Ohio. I will send you the latest details as soon as they are available.

Elreco also manufactures expansion units for roof bolting, overhead trolley material, junction boxes, trolley taps and miscellaneous safety devices.

G. K. McKee
PRESIDENT

THE ELRECO CORPORATION *Serving the mining industry since 1892*

2900 CORMANY AVENUE, CINCINNATI 25, OHIO

AMC Personals

A series of recent changes has been announced by Frank Whittaker, vice-president North American Coal Co. **Richard D. Sandoe** was appointed manager of preparation to study methods of the company's mines and supervise operations of its cleaning plants. **Paul A. Kleber** has been appointed vice-president and treasurer, succeeding **G. A. Troppman**, resigned. **L. E. Bramley** has been named manager of sales development. **Frank P. Townsend** has been appointed manager of Lake sales and special accounts and **S. K. Minton** has been appointed Detroit district manager. **Fred G. Fate** was promoted to distribution manager, and **Donald F. Boies** to traffic manager.

Donald H. McLaughlin, president, Homestake Mining Co., gave the commencement address at the Michigan College of Mining and Technology exercises on June 5. Honorary degrees of Doctor of Engineering were conferred on **Dr. McLaughlin** and on **William C. Cameron**, vice-president of the Celanese Corp. of America, and **Alex D. Chisholm**, general manager of the iron ore division of Pickands, Mather and Co.

Joseph van Ackeran, vice-president and assistant general manager of the engineering and construction division of Koppers Co., Inc., retired on June 11. He had been connected with the firm since 1925. **George M. Carvlin**, vice-president in the same division, has been made assistant general manager.

Rollin J. Kennard has been promoted to the post of mechanical superintendent of the Anaconda Copper Mining Co.'s reduction works at Great Falls, Mont., and the Conda, Idaho, plant.

James S. Conley has been elected president of The Wyatt Coal Sales Co., Wyatt Coal Co. and MacAlpin Coal Co., succeeding the late D. W. Martin.

L. H. Duriez, former manager of the Bayard department of U. S. Smelting Refining & Mining Co., has been named consulting mining engineer. **J. T. Lewis, Jr.**, has been named manager of the Bayard department to succeed Mr. Duriez.

Daniel F. McGlinchey was recently elected vice-president of the Phelps Dodge Copper Products Corp.

L. M. Pratt, vice-president and director, Kemmerer Coal Co., retired July 1 after more than 46 years of service with the company. Mr. Pratt is also vice-president and director of the Gunn-Quealy Coal Co.; president and director, Uinta Improvement Co. and official of a number of other organizations.

Promotions in the iron ore mining department of the Cleveland-Cliffs Iron Co., effective August 1, were recently announced by E. B. Greene, chairman of the board. **C. J. Stakel**, general manager of iron ore operations, is retiring but will continue to serve in a consulting capacity. Mr. Stakel has been with the company since 1905 in various capacities in connection with iron ore mining operations. **W. A. Sterling**, previously manager of the company's Mesabi Range properties, was elected a vice-president. In his new capacity he will direct the company's mining operations. **C. W. Allen**, manager of Michigan mines, has been appointed general manager of iron ore operations on both the Marquette and Mesabi Ranges under the direction of Mr. Sterling. **Grover J. Holt**, chief engineer, succeeds Mr. Sterling as manager of the Mesabi Range properties.

C. J. Stakel

John Reed Spriggs, fireboss at the Helen operation of Eastern Gas and Fuel Associates, has been promoted to ventilation and slate foreman. **Frederick A. Ritch** was recently named general foreman at the Stotesbury No. 8 mine. **O. A. Lilly**, coal inspector of the Winding Gulf group of mines since 1946, has been promoted to the position of preparation engineer, succeeding **M. N. Powers**, resigned. Mr. Lilly has been with Eastern Gas and Fuel Associates since 1940.

Ernest A. Messer, resident engineer in charge of Oregon activities of Alcoa Mining Co., has resigned to enter private consulting work. **Jack H. McWilliams** has been appointed as his successor. Mr. Messer, together with **Don C. Toye, W. D. Moreland, Charles Mumford** and **Grant Chandler** has formed an engineering and contracting firm Messer, Toye and Associates, Inc., with offices at Portland, Ore.

Holly W. Sphar has been elected a vice-president of Pocahontas Fuel Co., Inc.

C. R. Ranney is now operating engineer for the Nancy Lee Mines, Inc., and assistant to general manager, **Frank Eichelberger.** For the past two years he has been a consulting engineer in Mexico and prior to that time he was employed by the Great Northern Railroad as a geologist.

R. H. Knode, president, General Coal Co., recently announced the election of **S. Pemberton Hutchinson** as a vice-president of the company. Mr. Hutchinson has been with the company since 1925 and has been general sales manager since 1945.

M. G. McGrath, formerly metallurgist for the Atomic Energy Commission at Grand Junction, Colo., resigned recently to accept a post with the Vitro Mfg. Co. **John L. Chapman**, chemical engineer, has been employed by the AEC to fill the vacancy.

Earl C. Robertson has been named vice-president of Clinchfield Coal Corp., and chairman of Clinchfield Fuel Co., according to a recent announcement by J. P. South, chairman of the Pittston Co. and Clinchfield Coal Corp. For the past 12 years, Mr. Robertson has been sales vice-president of Pittsburgh Coal Co. and Pittsburgh Consolidation Coal Co.

R. W. Lottridge, general superintendent, Federal Mining and Smelting Co. for the past 3½ years, resigned his position on June 30, after more than 11 years with the company.

Edward Page, chairman of the board, New England Coal and Coke Co., retired on July 1 after 42 years with the company.

LeRoy W. Goodwin is the new director of the publications department of the Colorado School of Mines, according to a recent announcement made by President John W. Vanderwilt.

Samuel Goss has been promoted to pit foreman of the new Morton mine of the M. A. Hanna Co. and **Robert Van Evera** has been promoted to pit foreman of the Hanna mine in the Cooley District.

At a recent board meeting of the American Zinc, Lead and Smelting Co., **Alvin C. Eide** and **Richard Allen Young** were promoted to the position of vice-presidents of the parent company. Mr. Eide has served the company since 1916, and as manager of the pigment division. Mr. Young joined the company in 1939 and, since 1940, has been in charge of the Dumas, Texas, zinc plant.

Davis Read has terminated his duties as chief engineer in charge of production of the West Kentucky Coal Co. and after August 1 serves the company in a consulting and advisory capacity. Mr. Read began his connection with the company in 1908 and has been continuously in service except for a short period between 1916 and 1918. He became chief engineer in 1918 and for the past 10 years has been in charge of all mining operations and related production matters. **Moss Patterson**, chief of the Kentucky Department of Mines from 1940 to mid 1945, who has been associated with the company since March 1, 1950, will assume Mr. Read's former duties and responsibilities in the engineering and production division.

Davis Read

Dr. Alexander Stoyanow, professor of geology at the University of Arizona, will retire on July 1. He has been on the university staff since 1923.

William E. Hake, formerly assistant supervisor of a coal gasification pilot plant of the U. S. Bureau of Mines at Pittsburgh, Pa., is now on the technical literature staff of **Ketchum, MacLeod & Grove, Inc.**

E. C. Jones, assistant superintendent for Vermilion range iron mines of the Oliver Iron Mining Co., retired on June 1.

Dr. **Joseph L. Gillson** of the development department of E. I. du Pont de Nemours & Co., has been nominated to be a vice-president and director of the American Institute of Mining and Metallurgical Engineers for 1951.

Forbes B. Cronk retired on July 1 as general mining engineer of the Oliver Iron Mining Co. He was succeeded by **J. F. Wolff.** Mr. Cronk had been with the Oliver Iron Mining Co. since 1905 and for the past year acted as a consultant on engineering matters for the Orinoco Mining Co. in Venezuela.

A. B. Crichton, Jr., vice-president of operations, Johnstown Coal & Coke Co., a mining engineering graduate of West Virginia University, was awarded the professional degree of mining engineer at the 1950 commencement exercises.

Rawleigh Warner, chairman of the board, Pure Oil Co., was recently elected a member of the board of directors of the International Minerals and Chemical Corp. Mr. Warner was elected to fill the unexpired term of **John E. Bierwirth**, who recently resigned.

Arthur W. Worthington and **Ralph E. Larry**, respectively president and vice-president of Pittsburgh Limestone Corp., have retired and **Irvin L. Clymer** has been elected to succeed Mr. Worthington. Mr. Clymer will continue as president of Michigan Limestone and Chemical Co. and the Bradley Transportation Co., U. S. Steel subsidiaries.

G. A. Apell, formerly with the U. S. Bureau of Mines at Platteville, Wis., has been transferred to the Mt. Weather Station, Bluemont, Va.

H. C. Scarff, captain of the Spies iron mine, Cleveland-Cliffs Iron Co., has been transferred to Ishpeming, Mich., on the Marquette range. **Adolph Kauppal** has succeeded Mr. Scarff at the Spies mine.

John C. Bollinger, Jr., has been appointed assistant to the president, Lehigh Navigation Coal Co., Inc. according to a recent announcement by Evan Evans, president.

Pickands Mather & Co. recently announced the following changes in operating personnel effective July 1. **Everett L. Joppa** has been transferred to the Duluth general mining offices as an operating assistant. **E. J. Fearing** has been moved to Hibbing as general superintendent of the Hibbing district, succeeding Mr. Joppa. **Maurice L. Bradt** becomes assistant general superintendent for the Hibbing district mines. **Thomas C. Thielman** has been promoted to general superintendent of the eastern district mines on the Mesabi range. **Russell Kohn** has been promoted to superintendent of the Embarrass iron mine. **J. P. Schemmel** has been transferred to Crosby, Minn., as superintendent of the Cuyuna district, replacing the late P. S. Gray.

Marlin J. Weber is now operating vice-president of the Bird Coal Co. and its wholly owned West Virginia subsidiary, the Barnes Coal Co. He was formerly manager of mines for the company.

— *Obituaries* —

Harvey J. Nelms, 67, vice-president and general manager, Ohio & Pennsylvania Coal Co., died late in May. He had been associated with the company for some 20 years. The early part of his career was spent in the mining area of Western Pennsylvania and for a number of years he was in charge of operations for the Crucible Steel Co.

David W. Martin, 53, president, Wyatt Coal Co., Wyatt Coal Sales Co. and MacAlpin Coal Co., died in May. He had long been active in mine operations in Kanawha County and was a member of the board of directors and a past president of the Kanawha Coal Operators' Association.

P. A. Grady, 67, member of the accident-prevention bureau of the West Virginia Department of Mines, died in June after being hospitalized following a heart attack. Mr. Grady was one of the first mine inspectors in the State and a past-president of the Mine Inspectors' Institute of America and a past-president of the Kentucky River Mining Institute.

Harry R. Stanton, treasurer, Anthracite Institute, died in June following a brief illness. For 32 years he had been actively identified with the anthracite industry and at the time of his death was, in addition to his post with the Anthracite Institute, secretary of the Anthracite Operators' Wage Agreement Committee; treasurer, Operators' Fund of the Anthracite Board of Conciliation; treasurer, Anthracite and Bituminous Tidewater Emergency Bureau; and auditor for the Anthracite Committee.

Edward W. Stephens, 51, manager of belting sales for the Goodyear Tire and Rubber Co., died May 8 following a long illness.

Walter W. Bradley, retired state mineralogist, division of mines, State of California, died recently. Mr. Bradley had practiced mining engineering in the Mother Lode and in Mexico and Idaho.

Alexander P. Rogers, 76, noted consulting mining engineer, died in New York on June 29. He was president of several Canadian gold mine concerns and was part owner of the Bonanza gold mine in east Oregon.

YOUR FINGER

packs a load of POWER!

Every time you flip a switch or "press a button," you command a tremendous supply of dependable power. In fact, Americans are the most fortunate people on earth when it comes to the electric power that lights and runs their homes and factories. They have more of it, supplied at lower costs, than anyone else on earth. *And the giant share of all this power is generated by COAL!*

To help America's power companies meet the ever-increasing demands for low-cost electric current, America's progressive coal producers provide a dependable supply of specified grades of coal.

Coals of tested quality are supplied also to scores of other big customers—railroads, steel, paper, cement, chemicals, meat and other food packers—and the coal dealers who serve millions of homes and stores. The coal industry is vigorously at work to provide its customers with an ever better product for ever better utilization and thus a reduction of their fuel costs.

To do this big job efficiently, the producers of coal continue to invest heavily in research, equipment, and methods aimed to reduce production costs while delivering better prepared coals of good quality.

● *To continue most effectively to serve millions of America's homes, as well as its industry and commerce and to be ready to play its indispensable part in providing all the power needed in any national emergency—the coal industry requires only the opportunity to function at its best, in a fair competitive climate, free from governmental interference.*

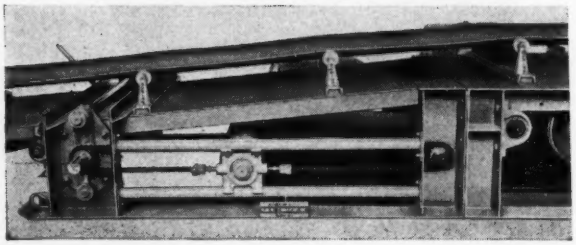
BITUMINOUS COAL

BITUMINOUS COAL INSTITUTE

A Department of National Coal Association

WASHINGTON, D. C.

ONLY ONE FIRM TAKES FULL MINE CONVEYOR PERFORMANCE

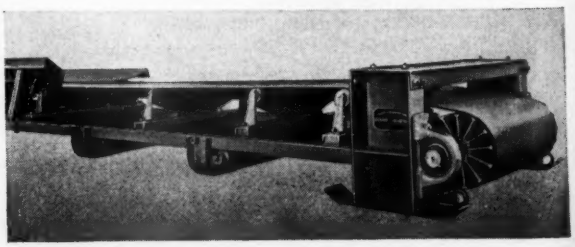


INTERNAL TAKEUP

Located directly back of the drive. Handles 10′ of belt slack. Operated by reversible ratchet-wrench working on gear reduction to minimize manual effort. Double-acting pawl prevents backing-up. Worked from either side of conveyor.

TAIL SECTION

Telescopic type to provide tail takeup action. Easy to clean out—no steel work under tail pulley. Has transverse cover to protect pulley, bearings *and belt*. Strong enough so you can rest a feeder on it.



RESPONSIBILITY FOR COMPLETE

. . . only HEWITT-ROBINS makes and guarantees both machinery and belt

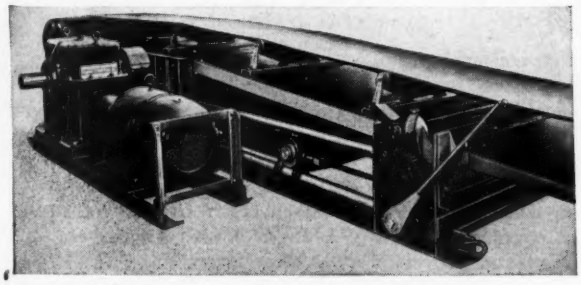
No longer need you worry about your Mine Conveyor operation—wondering who will be responsible for the successful, *lasting* performance of its machinery *and belt.*

Get your Mine Conveyor from Hewitt-Robins. Here is a company—the only company in all the world—able *and willing* to take complete *unified* responsibility for the installation. For only Hewitt-Robins makes both machinery *and belt.*

The machinery is the sturdy, strong, substantial construction made by the Robins Conveyors Division and installed in all the better mines. The belt is the long-wearing Ajax® Underground Belt—with mildew inhibitors and acid neutralizers compounded in its wear-resisting rubber covers and high tensile fabrics in its enduring carcass—made by the Hewitt Rubber Division.

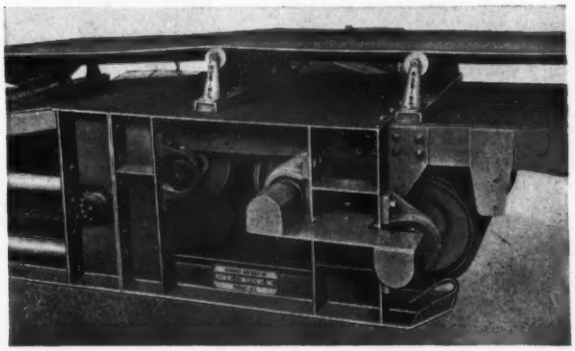
Yes, when you buy a Hewitt-Robins Mine Conveyor you get not only the best elements —machinery and belt—that your money can buy; you also get the satisfaction and peace of mind that come from having one unified source guaranteeing successful performance.

Hewitt-Robins Mine Conveyors can be shipped complete—machinery, belt, motors, reducers and drives—out of stock from Passaic, N. J., and Charleston, W. Va., in belt widths 26", 30" and 36", any desired length. For immediate delivery, get in touch with Hewitt-Robins, Inc., 1010 Pennsylvania Ave., Charleston, W. Va., or 270 Passaic Ave., Passaic, N. J.



UNIFIED DRIVE SECTION

Motor, reducer and controls mounted on a single base—skid-designed for easy moving about. Can be located on either side of the conveyor. Drive reversible—incoming for men and material, outgoing for high output of product.



SINGLE OR TANDEM DRIVE

Hewitt-Robins Mine Conveyors come equipped with *both* single and tandem pulley drive elements. Provide ample horsepower for lift and length up to the very limits of belt capacity. Reeving of belt handles level, uphill or downhill service requirements.

HEWITT-ROBINS
MINE CONVEYORS

HEWITT-ROBINS (HR) **INCORPORATED**

BELT CONVEYORS (*belting and machinery*) • BELT AND BUCKET ELEVATORS • CAR SHAKEOUTS • DEWATERIZERS • FEEDERS • FOAM RUBBER PRODUCTS • FOUNDRY SHAKEOUTS • INDUSTRIAL HOSE • MINE CONVEYORS • MOLDED RUBBER GOODS • RUBBERLOKT ROTARY WIRE BRUSHES • SCREEN CLOTH • SKIP HOISTS • STACKERS • TRANSMISSION BELTING • VIBRATING CONVEYORS, FEEDERS AND SCREENS

the fast,

low-cost way

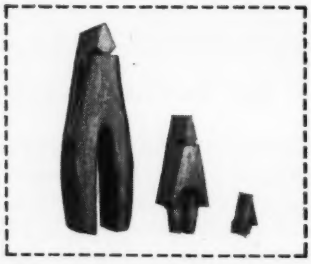
to get

worn teeth

back in service!

1. Worn tooth . . . 2. Plus AMSCO Tooth Repointer . . . 3. Equals like-new tooth—ready for service!

AMSCO® tooth repointers



AMSCO Repointer Bars

3 teeth partially rebuilt with AMSCO Repointer Bars to show sectional view of welding method. These Repointer, or Wedge Bars, are also made in many shapes and sizes. Apply AMSCO Economy Hardface to the rebuilt tooth *—for as much as 3 times longer service!*

● Here's a typical example of a badly worn dipper tooth completely restored to service . . . simply by welding on the AMSCO Cast-To-Size Tooth Repointer. The result is like-new service life and efficiency, plus a long-wearing tooth of Manganese Steel—the steel that actually work-hardens in service. Cost? *Far less than replacement!*

Wherever equipment has teeth that wear, more and more owners are using money-saving AMSCO Tooth Repointers . . . available in a wide variety of styles and sizes.

Get all the facts! Write today for Bulletin W-10-A —showing complete instructions for use.

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WELDING PRODUCTS

AMERICAN **Brake Shoe** COMPANY

AMERICAN MANGANESE STEEL DIVISION

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Other Plants: New Castle, Del., Denver, Oakland, Calif., Los Angeles, St. Louis. In Canada: Joliette Steel Division, Joliette, Que.

New Red Jacket Mine

Preliminary work on a new 4000 tons per day mine has been begun by the Red Jacket Coal Corp. The new operation, known as No. 17 mine, will be located approximately one mile above the Red Jacket community on Mate Creek in Mingo County, W. Va. When in full production and fully mechanized the mine will employ 450 men. The preparation plant will provide complete mechanical cleaning facilities. Coal will be produced from the Cedar Grove seams from extensive reserves that indicate a life of approximately 35 years for the new plant.

Coal Companies Qualify for Annual Report Award

From the almost 5000 corporation annual reports for 1949 submitted in the Tenth Annual Survey, conducted by *Financial World*, 16 coal and coke companies qualified for "Highest Merit Award" citations:

Ayrshire Collieries Corp.
Clinchfield Coal Corp.
M. A. Hanna Co.
Island Creek Coal Co.
Lehigh Coal and Navigation Co.
Old Ben Coal Corp.
Peabody Coal Co.
Pennsylvania Coal & Coke Corp.
Pittsburgh Consolidation Coal Co.
Philadelphia and Reading Coal & Iron Co.
Pittston Co.
Pond Creek Pocahontas Co.
Truax-Traer Coal Co.
United Electric Coal Cos.
West Kentucky Coal Co.
West Virginia Coal & Coke Corp.

These companies have become candidates for final judging and one will be selected for a "Best of Industry" award and presented with a bronze "Oscar of Industry" at the *Financial World* Annual Report Awards Banquet on October 30. The 1948 annual report of United Electric Coal Cos. won the trophy for the best report in this industrial classification.

Ebensburg Improvements

Mines of the Ebensburg Coal Co. at Colver, Pa., are undergoing extensive improvements, including larger mine cars and a belt-conveyor installation. Two new continuous miners are being installed to supplement the output of the two units of this type already on production work.

Piney Fork Portal Opens

At its Piney Fork Mine, Hanna Coal Co., St. Clairsville, Ohio, has opened its new portal house of modern design. A concrete block building with a steel and composition roof, is equipped with 480 chain lockers. A man coming off the mantrip walks only a few steps to enter the building, leave his lamp, and pass on to the change room where 45 shower heads provide adequate supplies of bath water. Miners can go on and come off shift with a minimum of wasted time and effort; adequate parking space is provided nearby and facilities within the building include a large meeting room where daily operations are discussed.

Bureau of Mines Marks 40th Anniversary

On Sunday, July 9, the U. S. Bureau of Mines marked its 40th year of progressive accomplishments in technological research and education in the mineral industries. Untiring efforts towards improved safety have been an important factor in helping industry to greatly reduce mine accident rates. Notable accomplishments have been made in the field of ventilation as well as in the commercial development of potash and molybdenum and a number of other mineral products. Advancements made by the Bureau in developing gasoline production processes and methods of utilizing oil shale have contributed greatly to extending our liquid fuel reserves.

In the field of mineral economics and statistics the U. S. Bureau of Mines has done a thorough job in providing the mining industry with a real wealth

L. E. YOUNG
Consulting Engineer
Mine Mechanization
Mine Management
Oliver Building Pittsburgh, Pa.

J. W. WOOMER & ASSOCIATES
Consulting Mining Engineers
Modern Mining Systems and Designs
Foreign and Domestic Mining Reports
UNION TRUST BLDG.
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of important statistical material on which to base its plans for the future.

Through an extensive series of reports of investigations and information circulars, almost every aspect of the technology of the mining industries has been advanced. A series of films on the mineral resources in various states and on specified mineral industries have proven to be a valuable medium in publicizing this nation's mineral wealth.

The American people and the members of the U. S. Bureau of Mines can take real pride in the record of 40 years of continued service of exceptional value and importance to the mineral industry.

TCI Plans Ore Terminal

A 36-acre tract of Mobile River property near Birmingham, Ala., has been purchased by the Tennessee Coal, Iron & Railroad Co. for construction of facilities to handle ore imported for the company's operations in that area. The undertaking is closely related to the U. S. Steel's iron ore developments in Venezuela and plans for the terminal facilities will not be concluded until the size and type of ocean-going vessels used for transporting the Venezuelan ore has been determined.

See It at the Mining Convention

MINE VENT

Flexible Ventilation Tubing

The tough, mildewproof, easy-to-install, light-weight mine ventilation tubing with simple patented couplings. Available in several grades, 8" to 36" diameter. Also Non-Collapsible Mine Vent Tubing for quickly exhausting foul air. Made by makers of ABC Brattice Cloth and Mine Vent Powder Bags.

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WARSAW, INDIANA

American Zinc Safety Record

Mine No. 2, American Zinc, Lead and Smelting Co., Mascot, Tenn., receives Sentinels of Safety trophy

A FORMAL ceremony cited American Zinc, Lead and Smelting Co.'s Mine No. 2 at Mascot, Tenn., for the best 1949 safety record among all underground metal mines in the nation-wide competition sponsored by the U. S. Bureau of Mines. Bureau Director Dr. James Boyd presented the Sentinels of Safety trophy awards of *The Explosives Engineer* magazine and individual certificates of achievement to the 206 miners and mine supervisors.

The awards were for the "outstanding safety accomplishment of not a single lost-time injury to an employe during a total work time of 410,051 man-hours." Mine No. 2 was also awarded the Joseph A. Holmes certificate for safety, with special recognition in the form of Holmes certificates and individual citations to the three Mascot foremen for outstanding safety records in their departments. A safety flag was also awarded the mine by *The Explosives Engineer* magazine.

International Coal Conference Report

The text of the papers presented at the International Conference on Coal Preparation held in Paris, June 26-July 1, are being reproduced both in French and in English and may be ordered from the Societe de L'Industrie Minerale, 216 Boulevard St. Germain, Paris 7e France at 2000 francs the set.

Blue Diamond Wins Holmes Award

The No. 1 mine of the Blue Diamond Coal Co. at Blue Diamond, Ky., was recently presented with the Joseph A. Holmes Award for outstanding safety accomplishments. This is the third award presented to this mine since 1939. The award was given for the six year period October 26, 1944 to January 31, 1950 for mining 4,300,790 tons of coal without a fatality.

TCI Abandons Mule Haulage

At its No. 5 limestone mine near Birmingham, Ala., the Tennessee Coal, Iron and Railroad Co., has retired six mules in favor of electric locomotive haulage. For many years mules filled a vital role in haulage, but are fast disappearing from the American mining scene. Mules in the service of TCI were kept in a lighted concrete stall, given the best of food and treated with great care and respect.

Mining Development Meeting

Late in June, subscribers of the Mining Development Program, Bituminous Coal Research, met in Huntington, W. Va., and voted to continue the program for an additional two-year period. Sufficient funds were subscribed to assure continuation of the work aimed at early completion of a practical continuous mining machine.

During a laboratory visit, the developments of the program were exhibited. E. R. Price, manager of coal properties, Inland Steel Co., spoke at a luncheon meeting giving the background and history of the mining development program. Dr. Charles E. Lawall, assistant vice-president of the Chesapeake and Ohio Railway Co. and chairman of the committee, reported on the committee's work and Gerald von Stroh, director of development, gave a comprehensive technical report on accomplishments. T. F. McCarthy, vice-president, Clearfield Bituminous Coal Corp., outlined the proposed future program which, in addition to the completion and testing of the con-

tinuous mining machine, include developments in face conveying, stainless steel belts, roof supports and rock dusting.

Consolidation's Mine 207 Closes

Consolidation Coal Co. (Ky.) Division of Pittsburgh Consolidation Coal Co., near Jenkins, Ky., has closed its mine 207 after a 38-year period of operation. During the course of its eventful life the mine underwent many changes. Originally hand loading was in practice with a minimum of face equipment which largely consisted of old breast machines and post punchers.

Later, arcwall cutters and electric drills were employed. Mules were replaced by cable-reel gathering locomotives. At that time the mine was producing about 1750 tons per day. A program was directed towards full mechanization in 1941 and finally the entire production was machine loaded. In September 1947, one crew set a record for a single shift's loading of 1466 tons of raw coal.

Coal Mine Employment Drop Predicted

A survey of 13 mining companies in the vicinity of Johnstown, Pa. indicates that employment will experience a further decline, according to the local office of the Pennsylvania State Employment Service. The 13 companies now have 7326 employes, compared with 8325 a year ago, and with 7620 three months ago.

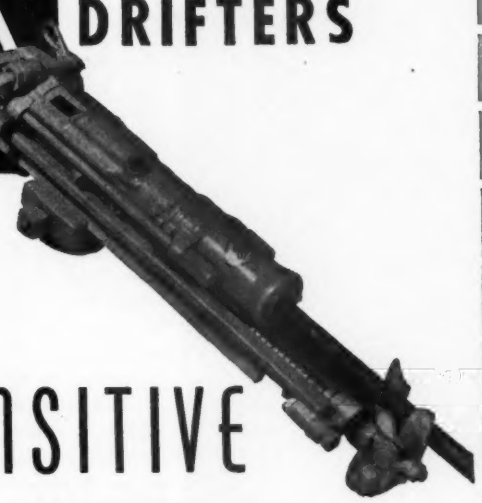
Anthracite Reserves Study

An engineering study made of the East Middle anthracite field of Pennsylvania has indicated that the life of the anthracite industry in that area could be extended by drainage. There are 32 known water pools in the field but the report notes that reserves inundated by 15 of them are insufficient to make draining worth while. One of the pools was unwatered during the course of the U. S. Bureau of Mines investigation, and the water in several others is being pumped into a drainage tunnel. Bureau engineers believe that the water in 11 others could be removed by ordinary pumping methods.

Three feasible methods were proposed for unwatering the remaining three pools which block off considerable anthracite. One of the methods would involve a drainage tunnel; the second, a central underground pumping plant; and the third, a deep well pumping plant.

Details of the problem and various solutions may be obtained from U. S. Bureau of Mines bulletin 491 obtainable from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., for 15c a copy.

POWER FEEDS FOR *Thor* DRIFTERS



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√ Carbide bit breakage virtually eliminated . . . even inexperienced drill runners can hold bit against bottom at correct feeding pressure.

On the job demonstrations now being arranged! Three sliding cone shell lengths — up to 48" x 48" (aluminum). Worth investigating — write or wire for a Thor service engineer today! Independent Pneumatic Tool Co., Aurora, Ill.

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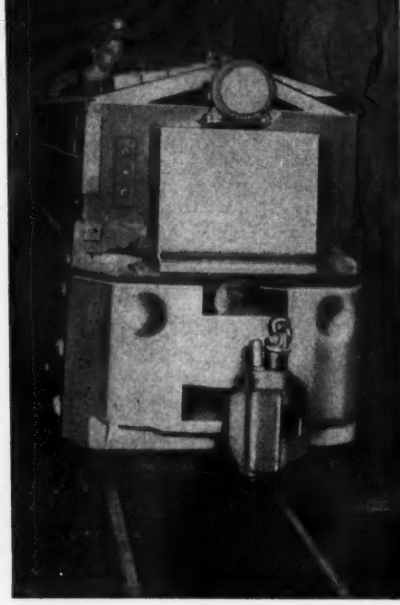
Thor PORTABLE POWER TOOLS

ELECTRIC • PNEUMATIC

How to keep them ON THE GO!



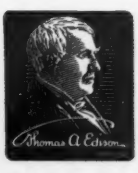
SHREWD MINE operators know that bogged-down locomotives, trammers or shuttle cars bring on blocked right-of-ways, snarled schedules and upped production costs.

They always keep this in mind when buying haulage batteries. Many have found that it is well worth the small extra premium to obtain the long life and dependability of rugged EDISON Batteries. EDISON cells are built of steel inside and out . . . they take temperature extremes, jars, jolts and accidents as part of the day's routine. Case histories show that many of them have fallen down shafts or been in fires or floods . . . and are still hard at work today!

EDISON Batteries are not injured by accidental short-circuiting or reverse charging, and can be charged direct from d-c lines in 6 to 7 hours without critical rate regulation. During shutdowns they can be stored indefinitely with no attention.

Write today for full information and a current price quotation. You'll find EDISON Batteries cost little more than other makes of batteries . . . and they pay this back over and over in terms of low upkeep and long, long life.

Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, New Jersey. In Canada, International Equipment Company, Ltd., Montreal and Toronto.



EDISON

Nickel · Iron · Alkaline

STORAGE BATTERIES

Typical Trammer Battery

Pittsburgh Consol Extends Acreage

A block of 4334.29 acres of Pittsburgh coal lands has been added to the Greene County, Pa., reserves of the Pittsburgh Consolidation Coal Co. The land is situated in the western Greene County section of Center, Franklin, Wayne and Morris Township, some distance from any present operating mine or from rail or river shipping facilities.

Model Coal Mining Community

Another forward step in the ten-year plan of the community of David, Ky., was taken when the town's swimming pool was dedicated on July 11. David is the community serving the Princess Elkhorn Coal Co. with residence facilities for the majority of its workers.

A nonprofit organization, the Princess Community Association, was founded in 1945 to undertake development of educational, recreational and welfare needs of the community of David. The association operates a motion picture theater built by the Princess Elkhorn Coal Co. and plans are being made for a new gymnasium adjacent to the schoolhouse. Other projects already completed in the ten-year old town are a market, a community church, Boy Scout and Girl Scout cabins, a modern school and a baseball field.

BOOK REVIEW

GEOLOGIC GUIDEBOOK ALONG HIGHWAY 49—SIERRAN GOLD BELT—THE MOTHER LODE COUNTRY—*Prepared under the direction of Olaf P. Jenkins, chief, Division of Mines, State of California. 1948. $1.00. 164 pp.*

RECENTLY the California Division of Mines released this volume celebrating the 100th anniversary of the discovery of gold in California. Those interested in the history of the Mother Lode country and adjacent areas will find the 11 chapters of this well-illustrated volume of deep interest.

Activities of the early pioneers who played such an important part in developing the gold mining industry in California are vividly portrayed. The geologic history of the Sierran gold belt, mining and milling methods, history of placer mining, and a detailed history of the Sierra Nevada province are covered.

In addition to the geologic value of this bulletin, the photographs and history of the charming towns of the Sierra foot hills are of deep significance to the development of western mining.

Hinged Flexco No. 500 is for use on Underground Extension Conveyor Belts and any other conveyor belts measuring 3/8" to 1/2" thick.

It is *new*. It is *strong*. It has a tightly wound spiral spring for a hinge pin that is flexible — can be easily inserted — easily removed—used again and again.

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Model 40-C Core Drilling Machine, with Gasoline Engine Power Unit and Oil Operated Hydraulic Swivelhead.

60 YEARS
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enables us to manufacture drilling machines that can be relied upon for long periods of continuous high-speed operation, with greatest possible percentage of core recovery. Modern designs, rugged construction, and liberal use of alloy-steel parts minimize time losses and operating expense.

Swivelheads can be either "Screwfeed" or "Hydraulic." Power-unit can be either a gasoline or Diesel engine, an air engine or an electric motor—each driving the swivelhead and hoisting drum through a built-in four-speed sliding-gear transmission. A complete line of improved accessory equipment provides for every drilling and sampling requirement. Catalog mailed promptly on request.

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Besides being manufacturers, we are also one of the largest contractors for any type of Core Drilling—including Grout Holes and Grouting. Experienced crews and supervisors are available at all times for service anywhere in the world. Estimates, and constructive suggestions whenever possible, submitted promptly without charge or obligation.

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have proved their superiority for years in all types of rock formation. Bits may be furnished with various grades of bortz diamonds, set in a matrix of either Beryllium Copper or Beryllium Nickel alloys. Available in a wide range of standard and special sizes ranging from 1½" to 7¾" in diameter.

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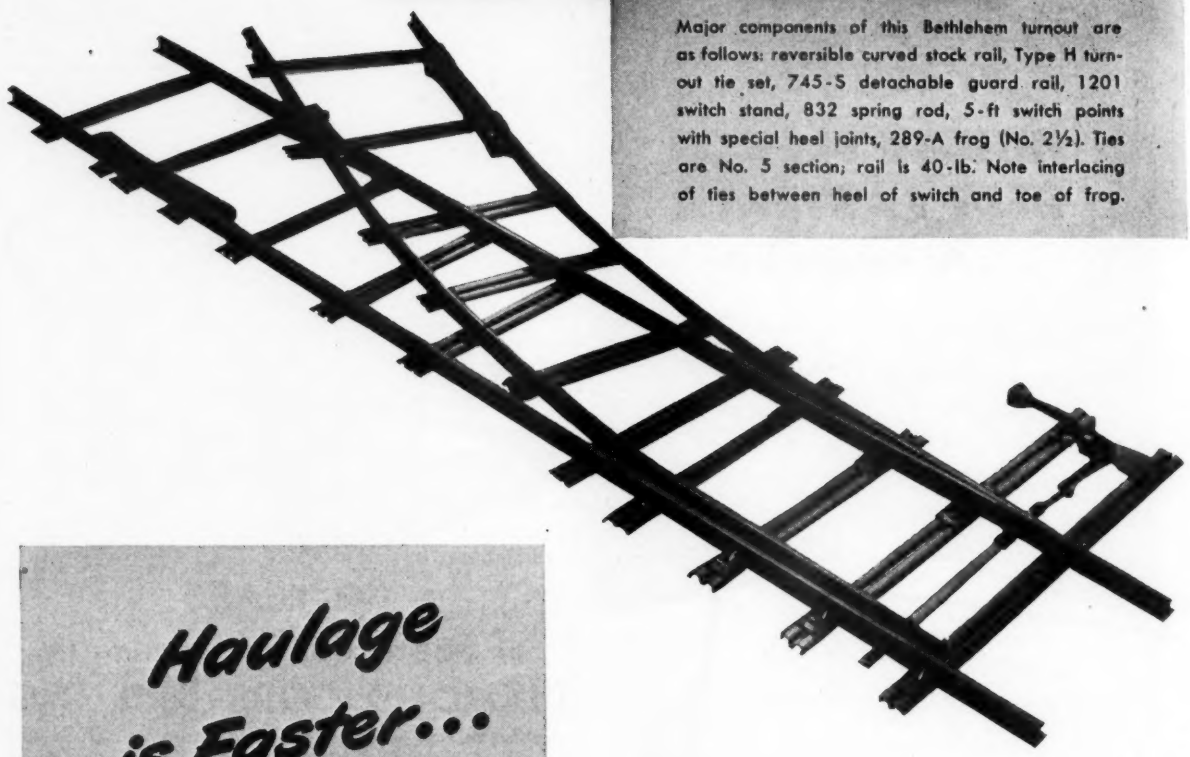

Major components of this Bethlehem turnout are as follows: reversible curved stock rail, Type H turnout tie set, 745-S detachable guard rail, 1201 switch stand, 832 spring rod, 5-ft switch points with special heel joints, 289-A frog (No. 2½). Ties are No. 5 section; rail is 40-lb. Note interlacing of ties between heel of switch and toe of frog.

Haulage is Faster... Safer... Less Costly with

BETHLEHEM *COMPLETE* TURNOUTS

Shown here is an all-Bethlehem turnout, complete to the last bolt and nut, and with each component placed as recommended. Obviously, with turnouts like this in your system, haulage will be faster, safer, and more efficient; the track less costly to maintain.

One big reason: every integral part is specially and carefully designed for the job it has to do, and each works in complete harmony with all the other parts. Thus, in such a turnout, you have no makeshifts; no stop-gaps; nothing "home-made" or improvised that may let you down just when you need the system most.

Another fine feature of Bethlehem turnouts is their reversibility. This is due largely to two factors — the reversible curved stock rail and a specially-punched tie for the number two position under the switch points. Thus the same turnout can be assembled right-hand or left-hand, with the 1201 or 1217 switch stand placed on either side.

A complete turnout supplied by Bethlehem is easily and quickly installed; assembly requires no special skill or training. Why not investigate? There's money to be saved by using this up-to-the-minute trackage — not to mention the time gained and the overall improvement in haulage.

BETHLEHEM STEEL

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On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

Central States

Copper Range Production

Low grade copper ore is being produced from the Champion mine of the Copper Range Co., Painesdale, Mich., at the rate of 700 tons per day. The ore is transported to the company's concentrator at Freda, Mich., for processing.

Each week a car of ore is being produced from the White Pine low grade copper property and delivered to the new pilot plant at Freda where research work is under way to determine the most suitable means of beneficiation.

Lead and Zinc Production Up in May

In the monthly report of the U. S. Bureau of Mines on mine production of lead and zinc for May 1950, it was stated that lead output from mines in states east of the Mississippi River dropped 14 percent and zinc output in this area increased four percent.

Production for Arkansas, Kansas, Missouri and Oklahoma together rose as a result of increased prices and a longer working month with increased output from Eagle Picher Mining & Smelting Co. and mines of the Nellie B. Mining Co., accounting for most of the gain. Similarly, zinc output gained because of increased activity at these properties.

Peabody Mine 40 Plans Fall Production

Mine 40 of the Peabody Coal Co., located in southern Illinois, plans to be in production early this fall. The main slope of the new mine will be approximately 1100 ft deep. The 50-in. No. 5 vein was the first cut during the sinking operation.

Uranium Leases Approved

Two uranium exploration leases have been approved by the Michigan State Administrative Board. They went to Jones & Laughlin Ore Co. on 80 acres in Baraga County; and to Thad D. Isham and James E. Leitch of Owosso, Mich., and 160 acres in Dickinson County.

To obtain a lease, the applicant must furnish evidence that Geiger counter reactions indicate a "possibility" of uranium. Lease holders must then spend at least $10 an acre for each of three years on exploration and a $25 filing fee must be paid on each 40-acre tract. The State Treasury derives ten percent royalty on any uranium discovered on state owned land. The royalty will be based on the value of the ore at the mine and be determined by the Atomic Energy Commission.

Joplin Mining Activity

The "Thousand Acre Tract" is showing the greatest activity in many years. Three small operators are mining lead and zinc ores at depths ranging from 6-70 ft.

F. E. Chambers, together with a partner, is operating a strip pit to uncover shallow lead ore from 6-20 ft thick. Three discovery shafts about 20 ft apart and 6-7 ft deep picked up the ore. In one week-long run a 1000 lb of hand-picked ore was recovered.

The Young brothers have a 5 by 5-ft shaft sunk by Childress and Temple which is 70 ft deep. A 9 by 9-ft drift is being driven in a run of soft zinc ore and will be widened to 14 by 14 ft a safe distance from the shaft. The shaft is unwatered by an 8-in. pump and serviced by an exploration hoist that will be replaced when mining operations are under way.

Frank Dale, Jr. and a partner are operating on a deposit of mixed galena and carbonate lead ore from a shallow shaft. A lot of 850 lb of sorted and hand-jigged galena-carbonate ore has been recovered from the prospect shaft which is being sunk with a hand windlass.

Schley Mine Stripping

The Schley mine, for many years an underground iron ore producer, is now being changed to an open pit mine by the Inter-State Iron Co. A new screening and washing plant is planned for the Schley mine, near Gilbert, Minn., and present schedules call for placing the mine in production by the opening of the 1951 ore shipping season. The Inter-State Iron Co. is shipping ore from the Columbia, Grant, Longyear and the Hill-Annex mines.

Truax-Traer Buys Binkley and Pyramid

The Truax-Traer Coal Co. recently disclosed the acquisition of the capital stock of the Binkley Coal Co. and the Pyramid Coal Corp. for $2,231,750. The transaction involved $751,750 in cash and $1,480,000 in Truax-Traer stock. Pyramid conducts strip mining operations in Indiana and Illinois while Binkley Coal Co. is engaged principally in the wholesale purchase and sale of coal. Truax-Traer Coal

At the annual commencement of the School of Mines and Metallurgy of the University of Missouri Dr. E. W. Engelmann, left, assistant general manager, Utah Copper Division, Kennecott Copper Corp., and Dr. C. J. Potter, right, president, Rochester and Pittsburgh Coal Co., were given honorary degrees of Doctor of Engineering. Dr. Curtis L. Wilson, center, is dean of the School of Mines and Metallurgy.

Co. has properties in Illinois, West Virginia and Indiana which had a combined output of 6,869,750 tons in the fiscal year ended April 30, 1949.

Tri-State Defense Area Proposed

A defense and shelter area has been proposed for the Picher mining district by Elmer Thomas, U. S. Senator for Oklahoma. In this area and in other parts of the Tri-State Mining District there are extensive open stopes in worked-out zinc mines. Senator Thomas stated, "I have been assured by our engineers that no place in the nation is there a comparable location for the installation of underground shelter for industry necessary for defense, and that shelter could also be provided for a million or more people."

Peabody Mine No. 57 Closed

Mine No. 57 of the Peabody Coal Co., located at Springfield, Ill., is now permanently closed after having been in continuous production since 1886. The 3000 tons per day supplied by this property will now come from the company's new mine No. 17 at Pana, Ill., which will shortly reach full production of 9000 tons per day. The employes at Mine No. 57 will be transferred and re-employed at other company properties.

Detonator Study Planned

A cooperative study of blasting caps will be made by the University of Missouri, School of Mines and Metallurgy, in cooperation with the explosives division of the Olin Industries of East Alton, Ill. One of the objectives of the work will be to determine whether there is any difference in the gradation and volume of broken rock resulting from any given blast by using different types of blasting caps. The work will be done at the school's experimental mine under the direction of Dr. J. D. Forrester, chairman of the department of mining engineering. F. S. Elfred, Jr., general manager, Olin Industries, will represent the Western Cartridge Co. in the experimental work.

Mission Farm Activities

Cruzan and Associates are sinking in an area test drilled by nine holes. The lease covers 22 acres of the Mission Farm just east of the Joplin, Mo., city limits. The area is owned by F. C. Wallower, president and manager, the Golden Rod Co. The drill holes are reported to have cut about 16 ft of soft ground that ran about 15 percent zinc blende. A 5 by 5-ft shaft is being sunk on a 14-in. drill hole in ore. An 8-in. pump is readily handling the water flowing from the drill hole. Hoisting is aided by an ingenious arrangement that enables the hoistman to control the hoist from his place at the shaft head.

Uranium Find in Michigan

Discovery of uranium ore has been reported in the Sturgeon River State Forest in Michigan's upper peninsula. High Geiger counter readings have been reported by state geologists of samples taken from the discovery area located 60 miles southeast of the pitchblende discovery made in August 1949 by prospectors for the Jones & Laughlin Steel Co.

Pacific Isle Activity

Mining and exploration is being carried out at five locations by the Pacific Isle Mining Co., Hibbing, Minn. Two shifts are engaged in mining and stripping at the York mine, Nashwauk, on the Mesabi range, and two shifts are engaged at the Lamberton mine in production and open pit development. A contract has been entered into with the Hedman Mining Co. to develop and mine ore that may be encountered at the Croxton Mine, Buhl, Minn. Diamond drill exploration is being undertaken near Randall, Minn., south of the active iron and magniferous ore belt of the Cuyuna range.

A thousand and one

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982

Michigan's Iron Reserves

Charles J. Stakel, general manager, Cleveland-Cliffs Mining Co., recently stated that Michigan's upper peninsula will be producing iron ore 100 years from now. He declared that Federal and State experts estimate there are 70 billion tons of low grade iron ores in northern Minnesota and upwards of 375,000,000 tons in the northern peninsula of Michigan. Mr. Stakel stated that research has already solved some of the mining and production problems of low grade ores and that the problem is continually under attack.

Increased Valuation of Michigan Mines

Through its appraiser of mines, E. G. Pardee, the State Tax Commission of Michigan revealed that the valuation of the State's iron ore properties, located in the Upper Peninsula, has been increased to $62,349,000 from last year's figure of $59,329,000. Mine values in the copper district were lowered with the value of all mines placed at $3,580,000 as against $3,705,000 in 1949.

J. & L. Plans New Iron Mine

Shaft-sinking operations at the Tracy Mine near Negaunee, Mich., will start this fall, according to a recent announcement. H. S. Peterson, general superintendent, Jones & Laughlin Ore Co., stated that the mine is expected to produce a million tons of iron ore a year and will make its first shipment in 1954.

PM Prepares Carmi-Carson Lake Property

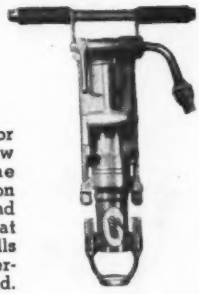
West of Hibbing, Minn., on the Mesabi iron range, Pickands Mather & Co., operating agent for the Utica Mining Co., is placing the Carmi-Carson Lake property in readiness for fall operation. Power shovels and trucks are on order in preparation for this stripping program, and construction work is going forward to provide required facilities.

Michigan Coal Resources

A reappraisal of Michigan's coal resources by the U. S. Geological Survey reports measured reserves of 125,000,000 tons remaining in the state. At present, only one coal mine is in operation and is producing about 12,000 tons annually. In 1907, some 2,000,000 tons were produced from 37 mines.

The survey was prepared in cooperation with the Michigan Geological Survey Division of the Department of Geology of the University of Michigan, as a part of the U. S. Geological Survey's program to reestimate the U. S. coal resources.

NEW "35" SINKER



Easy to handle, the new Thor 35-lb. Sinker features new Blower Valve for full line pressure blowing, in addition to all the many design and operating advantages that have made Thor Rock Drills outstanding performers wherever percussion tools are used.

Ask for Circular IE-1139

NEW SINKER LEGS

3 GREAT MODELS

Ask for Circular IE-1132

Compact air feed leg clamps to standard Sinker Rock Drill, converts upward lifting action to positive forward feeding pressure. ONE MAN can carry it . . . set it up . . . drill round after round without wasted time or motion.

GREAT COST-CUTTERS WITH CARBIDE BITS

Replace larger Drifters, jumbo set ups, large diameter drill steels and bits, large sizes of air compressors, air line and explosives!

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Also available in the popular

STANDARD ONE-SPEED DRILL

The Parmanco Two-Speed Transmission Drill is designed to meet the requirements of the general prospecting field where it is not necessary to drill in solid limestone. Special sliding frame permits drilling and pulling of augers without moving drill. New design of chuck eliminates all hand operation in raising power plant. Recommended for 50 to 60 feet with four and one-quarter inch equipment. Under favorable conditions it is being used to greater depths and can be used with six inch equipment.

PARIS MANUFACTURING COMPANY

PARIS, ILLINOIS

Wheels of Government

(*Continued from page* 86)

(1) the awarding of simple contracts for exploration to "small mines" and defining such mines as including mines primarily producing "(a) lead, zinc, or copper ores, or ores containing a combination of such metals, the average aggregate monthly production of which does not exceed 100 tons of lead, zinc, and copper metal combined, and (b) manganese, mica, chromite, mercury, and tungsten ores and ores of other minerals and metals the average monthly production of which by quantity does not exceed approximately the market value of 100 tons of lead computed and fixed as of the effective date of this Act"; (2) producers to have access to all calculations, analyses, and determinations used as a basis for aid under the Act; (3) the making of annual reports to Congress on the operation of the Act; (4) authorization of advance payments to be made to producers for exploration projects where they certify the need for such advances as working capital; and (5) permission for the Secretary of the Interior to transfer appropriated funds to the Administrator of General Services to carry out the purposes of the Act.

The bill would authorize appropriations of $80,000,000 annually for the proposed program.

Fuels Investigation

The Senate Committee on Interior and Insular Affairs has reported S. Res. 239 by Senator Myers (Dem., Pa.) authorizing this committee to (1) make a full and complete investigation and study of available fuel reserves of U. S. and probable future rates of consumption thereof; (2) formulate a national fuel policy to meet needs of U. S. in times of peace and war, such policy to include use of all fuels and energy resources except atomic energy; (3) study and recommend methods of encouraging developments to assure availability of fuels adequate for an expanding economy and the security of the U. S.; and (4) report to the Senate at the earliest practicable date, not later than September 15, 1950, results of its investigation and studies together with recommendations.

In reporting the bill the committee reduced the expense authorization from $100,000 to $20,000. It is expected the studies will be made by specialists functioning under the committee's staff.

Western States

New Mexico Production Up

War in Korea has resulted in speeding up of metal mining—copper, zinc and lead—in New Mexico, with all mines in the Silver City District on a six-day week of three shifts, and Chino Mines on a seven-day week. Full-time operations by the metal mines of Southwest New Mexico, following signing of new contracts with the International Union of Mine, Mill and Smelter Workers has brought about peak employment for miners and cancelled out unemployment for hundreds of miners that extend over a period from June 1949 to May 1950.

Drill Tests Near Jerome

The Mingus Mountain Mining Co. has contracted with the Boyle Brothers Drilling Company of Salt Lake City, Utah, for diamond drilling at its property about one-half mile north of Jerome, Ariz. According to Dr. G. W. H. Norman, chief of the Verde geophysical exploration staff, the first hole will be drilled to a depth of more than 1000 ft. It is expected that drilling operations will continue throughout the summer. A crew of six men, under the supervision of Paul Park, is already at work.

Summit King Increases Reserves

Summit King Mines, Nevada's third largest silver producer in 1949, is continuing to mill approximately 50 tons a day of silver-gold ore from its properties in the Sand Springs area, 25 miles east of Fallon, Nev. The company is reported to have increased its ore reserves in recent months by extensive development work conducted from the 700-ft main shaft. An affiliate of Bralorne Mines of British Columbia, Summit King Mines operated on a major scale in prewar years and resumed production three years ago.

Snow Point Placer Operations

Revival of placer gold mining is forecast for this year in the Snow Point area west of Graniteville located 25 miles northeast of Nevada City, Calif. Snow Point Properties of Beverly Hills is extending a drift along the continuation of the Snow Point channel, following location of gravel carrying profitable gold values at the bottom of a 250-ft vertical shaft.

San Manuel Encounters Water

The San Manuel Copper Corp., Tiger, Ariz., has encountered a heavy flow of water during its shaft sinking, and is temporarily postponing further development until the flow of water has lessened and drainage has reduced pumping demands. Both the exploratory shaft within the ore body and the working shaft in the footwall have been completed to a depth of over 1400 ft. The shaft within the ore zone, although ordinarily expected to carry the greater water load, has not presented the greatest difficulty because the ore mass contains clayey seams which restrain the flow. The shaft in the footwall, however, has required the pumping of around 1000 gpm. It is planned to drill horizontal holes from the bottom of the shaft to accelerate drainage and thus make possible earlier resumption of development work.

AS&R Enters Metaline Field

Latest mining company to enter the Metaline zinc-lead field is the American Smelting & Refining Co., which has taken option on the Van Stone mining property in Stevens county, Wash., from the Willow Creek Mining Co. Adjacent territory has been taken under option, pending diamond drill exploration of the Van Stone. The company has established an office at Northport, Wash., with A. N. Mastrovich in charge as resident engineer.

Wyoming Open Cut Coal

Southwestern Wyoming, traditionally a deep coal mining area, is to have open pit coal mining in the near future. Announcement has been made in Rock Springs, Wyo., that the Morrison-Knudsen Construction Co. of Boise, Idaho, has contracted with the Kemmerer Coal Co. to open strip mines near Rock Springs and at Kemmerer. Stripping operations already have started at the latter.

Equipment has been arriving at Rock Springs and being moved about

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Crown cutting affords faster drilling than you have ever experienced. And in other ways Rok-Bits are engineered to better your footage at less cost. Note how air holes are placed for better blowing—the self-cleaning chip channels—the threads designed especially to match this bit's outstanding performance. Check your present bit performance against Rok-Bits. Request folder. Rock Bit Sales & Service Co., 2514 East Cumberland St., Philadelphia 25, Pa. Branch: Ashville, N. C. A complete line of pneumatic tool accessories.
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ROK-BIT—the only carbide bit with crown cutting edge

three miles southwest of the city and south of the tipple of the Gunn-Quealy mine at Sweetwater. Roads are already under construction. The strip mines will operate in the summer, stockpiling coal to meet peak winter demands.

Arizona Mineral Discovery

Wherryite is the name of a new Arizona mineral, discovered by E. B. Daggett near the 760-ft level in the Mammoth mine at Tiger, Ariz., and described in the January-February issue of the American Mineralogist. The mineral is a complex lead sulphate. It was named in honor of Edgar T. Wherry, first editor of the American Mineralogist. Wherryite is said to increase the number of new minerals found first in Arizona to 15, and that 14 of these are found nowhere else in the United States.

Rocky Mountain Coal Institute

The 46th annual meeting of the Rocky Mountain Coal Mining Institute, representing Colorado, New Mexico, Montana, Wyoming and Utah was held at Glenwood Springs, Colo., on June 19, 20 and 21. Speakers included George L. Clemons, manager of the Salt Lake City branch of the Goodman Manufacturing Co., who presented a paper on "Caterpillar" type coal loading machines, and John Peperakis, assistant manager at the Sunnyside Mine of the Kaiser Steel Corp., who discussed "roof bolting." Presiding at the meeting was 1949 president of the Institute, G. E. Sorensen, manager, Kemmerer Coal Co.

Officers elected for the coming year included A. B. Foulger, vice-president and general manager of the Lion Coal Corp., Ogden, Utah, as president; Claude P. Heiner, vice-president for Utah, and H. C. Livingston, vice-president in charge of operations, Union Pacific Coal Co., vice-president for Wyoming. Other vice-presidents were J. B. Burns for Colorado; G. E. Gilroy for Montana, and J. Van Zant for New Mexico.

Newmont Plans Explorations

An extensive exploration program in the Candelaria silver-gold district south of Mina, Nev., is reported planned by Newmont Mining Corp. The company is preparing to drive a crosscut tunnel into virgin country east of the mines which operated some 70 years ago. Erection of camp buildings is expected to begin as soon as mining machinery has been installed.

Newmont investigated mines in the Candelaria, Rawhide and Silver Peak districts last year, and is understood to have acquired a large group of claims near Candelaria. The district was formerly one of Nevada's foremost silver-gold producers.

Mountain City Ore Discovery

Rich copper ore has been found in the Mill Creek mine at Mountain City, Nev., according to Del E. Smith of Logan, Utah, president of the Mill Creek Copper Co. The 30-claim property adjoins the Rio Tinto, owned by the Anaconda Copper Mining Co., which closed down in 1948.

The discovery was reported made in a winze from the 380-ft level. The shaft reaches the 565-ft level, but the lower workings are flooded. After determining the width and strike of the vein, it is planned to pump the shaft and raise on the ore. The ore is said to resemble that which made Rio Tinto (later called Mountain City Copper) a market sensation some 15 years ago.

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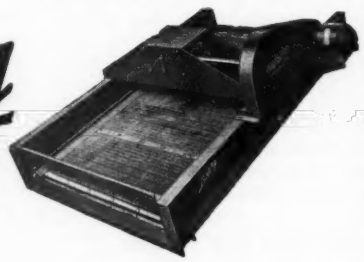

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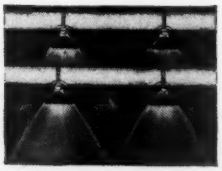

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Indian Land Withdrawn from Prospecting

A tract of 56,720 acres of Navajo tribal land north of the Carrizo Mountains in northeastern Arizona has been withdrawn from prospecting and mining of uranium and vanadium for a three-year period. The announcement of the withdrawl came from Allan Harper, general superintendent of the Navajo Indian Reservation, in association with members of the tribal council.

The action was taken, it was said, to allow the U. S. Geological Survey to examine and drill portions of the land under supervision of the Atomic Energy Commission. The AEC will be permitted to conduct a reconnaissance survey over the entire Navajo reservation.

Trapped Miners Rescued

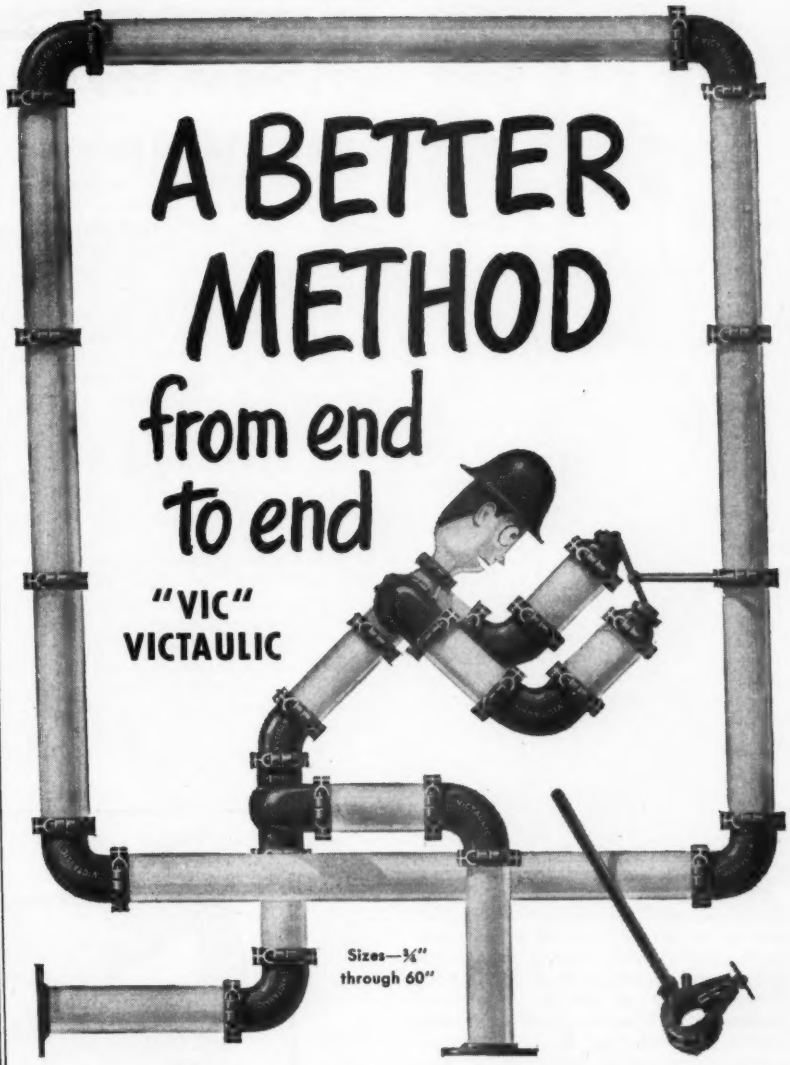
Fourteen miners trapped 700 ft underground in a burning copper mine at Copper Canyon, Nev., all reached safety seven hours after the fire began. This included one man who slipped off a treacherous ladder and plunged 50 ft in darkness. The miners escaped through an abandoned shaft. The last man out was mine superintendent Robert Raring, who had gone down the abandoned shaft in a successful attempt to lead the trapped men to safety. Raring explored various crosscuts leading from the abandoned shaft to the area in which the trapped men were working and led them out. Mine engineer Thomas Cahill of the Copper Canyon Mining Co., said that the fire of unknown origin broke out at the top of the main shaft.

Hypotheek Drives to Objective

The Hypotheek Mining and Milling Co., near Kellogg, Idaho, expects to reach its objective by September 1. Caved stoping ground has been passed and the 900-level drift is being continued. A waste and ore bin are being constructed on the surface and shaft facilities are being placed in readiness for hoisting. Ventilation equipment was recently installed to exhaust foul air and smoke from the 900-level drift.

Manganese Output Expanded

Production of vitally needed manganese is being expanded by the Luck Mining & Construction Co. from its Boston Hill mine at Silver City, N. M. This mine is New Mexico's largest manganese operation. Shipments of 300 tons daily go to the Colorado Fuel & Iron Corp. steel mills at Pueblo Colo.



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PIPE COUPLINGS AND FITTINGS

New Park Uranium Exploration

New Park Mining Co. will start exploring soon in the Marysvale, Piute county, Utah territory, W. H. H. Cranmer, company president and general manager, recently announced. The announcement came at the annual stockholders meeting in Salt Lake City. He disclosed that New Park already has begun preliminary studies in the area. Actual mining operations will start as soon as possible.

Bowman-Fordyce Development

Developed of a gold vein is reported at the Bowman-Fordyce mine in the Bowman Lake district of California. The vein is reported to assay $33 a ton to a depth of 30 ft, with indications favorable for its persistence below present workings. Installation of some machinery has been completed.

Palisade Development

Extensive development work has been resumed by the Palisade Mining and Milling Co. at its property on the West Fork of Pine Creek in the Coeur d'Alene district of Idaho. Diamond drilling, surface reconnaissance by bulldozer and extension of the main adit are on the program for this summer's activities.

Ajo Smelter in Production

Fires have been started by Phelps Dodge Corp. at its new $7,000,000 smelter at Ajo, Ariz., and initial runs made in mid-July. Ovens have been heated and tested since June 20, and full operation of the plant is now under way. The new smelter is the major part of the $11,000,000 improvement program instituted in 1949 by Phelps Dodge for the New Cornelia Branch at Ajo.

No Sale on Mogollon Claims

Reports that Mogollon, N. M., largest gold-silver producer in the Southwest, with a record over a 50-year period approximately $50,000,000, has joined the ghost mining towns, has been denied by Mrs. Madelyn Caraway, who for the past five years has been carrying on extensive development there, together with other less important mining operations. The report was started by a published notice of an auction sale of buildings and lots in the town of Mogollon by J. P. Holland, owner. This sale does not include any of the mines or mining claims in the Mogollon Mining District and Cooney Mining District. Last profitable mining operations at Mogollon were carried on for a ten-year period by the Black Hawk Consolidated Mines Co., which was shut down by Government orders at the outbreak of World War II and did not resume after the end of the war.

Mike Horse Resumes Operations

The Mike Horse mine began producing lead and zinc ore about July 1, ending a seven-month shutdown. The company operates 50 miles northwest of Helena, Mont., near the town of Lincoln. The plant is owned by the American Smelting and Refining Co. A. E. Haeseler, general superintendent stated, "The management feels the price position has improved to the point where we can resume production."

Bullfrog Reopens

The U. S. Smelting Refining and Mining Co. is reopening its lead-zinc property at Bayard, N. M. The mine has been closed for about a year. The company stated that although operations will be conducted on a limited basis, and an operating loss is expected, it is believed that the net out-of-pocket expenditures will not greatly exceed the cost of maintaining the property on a standby basis. In addition, valuable information with respect to future possibilities of the mine will be gained.

Volo Mining Company

The Volo Mining Co. has leased the Clayton gold property, two miles west of Placerville, Calif., and started hauling ore to its mill near El Dorado, four miles beyond to the west of Placerville. Development and operation of the Clayton on a substantial scale is planned if mill tests of the ore prove satisfactory.

AS&R Anode Plant in Production

Production started on Monday, July 17, at the new $3,000,000 anode casting plant which the American Smelting and Refining Co. has constructed adjacent to its smelter at Garfield, Utah. The blister copper is transferred hot from the converter plant to the anode plant, where, after blowing with air injected through pipes, and poling with wood poles, 200-ton charges are cast into 700-lb anodes.

The anodes will be sent to the new refinery being constructed at Garfield by Kennecott Copper Corp. and to Asarco's eastern seaboard copper refineries at Baltimore, Md., and Perth Amboy, N. J. There they will be processed further. The anode plant probably will consume the entire output of the blister copper from the smelter, but the blister producing equipment will be kept in standby condition. The new unit consists of a 147 by 450-ft building and a 300 to 25-ft leanto.

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Why? Because they've worked with it for 3 years on some of the toughest applications from the standpoint of abrasion and impact to which steel has ever been subjected.

They've seen J&L heat-treated Jalloy plates—in ore chutes, truck bottoms, bang-boards, baffle plates and in other similar applications—*last 4 to 6 times longer than mild steel.*

They've seen the long life of Jalloy *cut the cost of* steel for certain applications *by more than one-half.*

They've seen it *save thousands of man-hours of work*, and *step up production* by thousands of tons of iron ore, by eliminating the down-time required to replace steel that could not "take it" for a full season.

These 3 years of exhaustive field-testing have proved that J&L Jalloy is really "hard stuff"—that it stands up under the most gruelling abrasion and impact conditions—that it saves both time and money.

If abrasion and impact are eating away the steel in your equipment—and eating up your profits by frequent down-time and costly replacements—it will pay you to investigate J&L Jalloy steel.

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Light Weight Diesel

A new compact, light weight Diesel engine is now in production by the Detroit Diesel Engine division of General Motors. The new "110" engine is a six-cylinder two-cycle unit rated at 275 hp and built to meet the

requirements of large earth-moving vehicles, and general industrial, oil field and marine equipment. The engine can be obtained separately or equipped with special accessories. Optional accessories, which may be powered directly from the gear train, include a hydraulic steering pump, an air compressor and a pump to circulate oil through a General Motors torque converter designed specifically for the engine and installed as an integral unit for applications where a fluid drive is advantageous.

Mineral Testing Laboratory

A mineral testing laboratory has been opened by Western Machinery Co., San Francisco, to serve the metallic and nonmetallic industries, the coal preparation industry, the sand and gravel aggregate industries and other industries whose products require a similar type of material processing. A mineral testing department, made up of experienced metallurgical engineers, has been organized to operate the laboratory and provide service to industry on a cost basis. Mineral engineering problems of all types will be handled and each investigation will include presentation of a completely detailed metallurgical report with the recommended flowsheets to be used as a basis for commercial plant design.

Car Block Prevents Runaways

Unsafe car blocking methods are said to be eliminated by the Nolan Model C Car Block for preventing railroad or mine car movement. The heat-treated alloy steel unit is made by The Nolan Co., Bowerstown, Ohio. The design permits locking of the block to the rail so that the unit cannot be moved by the car.

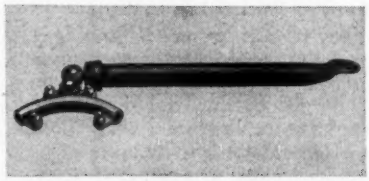
Roof Bolt Hole Checker

A hole diameter gage, manufactured by Ohio Brass Co., Mansfield, Ohio, is designed to make it possible

to obtain accurate checks on roof-bolt hole diameters by means of an ingenious arrangement of three steel balls around a conical plunger. Hole diameters may be read in 1/16-in. increments on the exposed end of a rod attached to the plunger.

Trailing Cable Shock Absorber

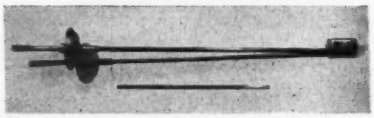
For use on trailing cables in mines, Mosebach Electric and Supply Co., Pittsburgh, Pa. has designed a new shock absorber to allow for slack when connecting cables to junction boxes or



any source of power. A spring within the case takes up sudden jerks or load pulls and helps prevent breaking of the cable. Types are available for adaption to any type of trailing cable used on cutting machines, machine trucks, portable air compressors, loading machines, rock drills or rock dusters.

Manual Jet-Piercing Blowpipe

By means of a new development of the Linde Air Products Co., New York, holes for 1⅛-in. diam dynamite can be quickly pierced to a depth of 5 ft in hard and abrasive rock. The



Jet-Piercing blowpipe can be supplied in greater lengths for piercing holes to a depth of 7 or 9 ft, or more. With the new unit, holes may be drilled at any angle. Field tests have resulted in speeds ranging from 22 to 60 ft per hour, depending upon the type of material being pierced. A mixture of oxygen and either kerosene or fuel oil is burned in the new Linde FSJ-1 blowpipe.

Packaged Conveyors

The Barber-Greene Co., Aurora, Ill., has announced the production of its Redi-Fab series of conveyor belts available in 49 lengths, 3 widths and with numerous other variables. The new series of conveyor belts are packaged into components to give the greatest number of combinations. Simplicity in selection and erection are advantages claimed for the new product. Detailed information may be obtained on application to the company.

Geiger Counters for Aircraft

A Geiger-Mueller Counter specifically designed for installation in light aircraft for uranium prospecting, is now available from the Radiac Co., New York City The "Prospectometer" gives an audible warning signal whenever the radiation intensity increases above a selected level. Following field tests of a prototype unit in Colorado, Utah and Ontario, a standard model has been developed to fit a wide range of applications. Other units are available to meet the requirements of special applications for airborne and carborne radioactivity detection instruments.

New Federal Truck Line

A new series of light, medium-duty commercial vehicles, known as the "Style Liner" has been announced by the Federal Motor Truck Co., Detroit,

Mich. Many features of the new series have been completely redesigned including the body, power plant, steering mechanism and frame. Every effort has been made to attain maximum comfort and safety and improvements offered will appeal to drivers and to those who have capacity and cost as prime considerations.

Automotive Diesel

A heavy-duty truck Diesel suitable for the operation of trucks, buses and tractors carrying gross loads up to 52,000 lb has been announced by the Buda Co., Harvey, Ill. The 152-hp Diesel is a six cylinder model of the solid injection type.

Adjustable Relay Dial

Adjustable dials may be obtained for the time delay relays manufactured by A. W. Haydon Co., Waterbury, Conn.,

for convenience where frequent changes in time settings are required. New standardized a-c timing motors produced by the company feature high starting and running torque and quiet operation. The units are provided with a wide range of speeds and current ratings.

Eye Conservation

An 82 percent reduction in the cost of eye injuries was effected by the Shell Pipe Line Corp. through the adoption of an eye conservation program. An official of the American Optical Co., Southbridge, Mass., stated that the company, which employes 1200 workers, spent only $958 in 1949 for safety goggles and eye injuries as compared with $5,249 in 1946 before the eye-protection program was installed.

The program involves a vision check of employes to ascertain whether they needed a complete eye examination and correction and the supplying of safety goggles to workers on eye-hazardous jobs. Workers with deficient vision received prescription goggles for correction and protection of their vision.

— *Announcements* —

William H. Cordes, general staff manager of the general sales department of **American Steel & Wire Co.**, recently announced the establishment of separate advertising and market development divisions. **O. B. Stauffer** was appointed manager of the advertising division and **John E. McGrath** was made manager of the market development division.

Jeffrey Mfg. Co. has announced the removal of its West Virginia district office from Huntington to 403 City Avenue in Beckley. **E. H. Hebden** is district manager.

The Cleveland office of the **Robins Conveyors Division, Hewitt-Robins, Inc.**, has moved to 8905 Lake Avenue.

Pierce Management, Inc. has announced the execution of a contract with the Carbonifera Unida De Palau, S. A. and Nacional Financiera, S. A. of Mexico, for design of a completely mechanized coal mining plant plus a three year mine management contract.

R. S. Stevenson has been appointed general sales manager of the **Allis-Chalmers** tractor division to succeed **Marshall L. Noel**, resigned. Mr. Noel has joined the **Tractomotive Corp.** as vice-president and treasurer.

Walter A. Huber has been appointed general manager of the wire rope division of **John A. Roebling's Sons Co.**

A. F. Fenner, vice-president, **Mack-International Motor Truck Corp.**, was recently appointed general sales manager. **E. G. Ewell**, vice-president, has been named general sales manager of the company's Eastern, Atlantic and Southern sales divisions.

Jack F. Chapin has been appointed development engineer in charge of product and process engineering by the **Flexible Tubing Corp.** **Wesley L. Guiles**, company representative for the U. S Air Force winter maneuvers, has been named a technical representative.

L. J. Lange has been appointed industrial power product specialist of the **International Harvester Co.** to succeed **S. L. Siegfried.**

Jack D. Grace is now in charge of advertising and publicity for the **Nordberg Mfg. Co.** He succeeds **Delbert Kay**, resigned.

W. D. Calland has been appointed district sales manager for the far west for **Marion Power Shovel Co.** **Ernest J. Riggs** has been named district sales manager for the mountain states.

Ralph Hanes, director of advertising, **Dodge Mfg. Corp.**, has announced the appointment of **Kenneth Bassett** as supervisor of sales promotion.

William A. Meiter has been named to the newly created position of central sales manager of **Worthington Pump and Machinery Corp.**, to direct sales of the Buffalo, Detroit, Cleveland, Cincinnati and Pittsburgh offices. **John W. Stovall** has been named manager of the Buffalo district sales office succeeding Mr. Meiter.

CATALOGS AND BULLETINS

CRAWLER TRACTORS. *International Harvester Co., Chicago.* Two new two-color catalogs are available. One describes the TD-18A and the other the TD-14A crawler tractor. Both are complete with pictures, sectional views and diagrams fully illustrating features of the new units.

PORTABLE BLOWERS. *Joy Mfg. Co., Pittsburgh 22.* A new eight-page bulletin describes the line of Axivane portable mine blowers for mines and tunnels and gives detailed information on the vaneaxial-type blowers ranging in size from ½ to 5 hp. Blower performance is presented in both graph and tabular form.

RECONDITIONING CARBIDE BITS. *Rock Bit Sales & Service Co., Philadelphia. 25.* A 20-page booklet, available on request, shows how to successfully recondition tungsten-carbide bits and contains helpful operating suggestions for drillers on means of obtaining maximum speed and footage. The complete line of Rok-Bits are described.

UNIT WASHERY. *McNally Pittsburg Mfg. Corp., Pittsburg, Kans.* A new bulletin describes a Baum-type jig unit washery and includes data and work sheets for design of coal-cleaning circuits. Descriptive materials show how the washery can be added to a present building and illustrates three basic washing circuits. Bulletin No. 450 will be sent upon request.

—Index To Advertisers—

	Page
American Brake Shoe Co. American Manganese Steel Div.	94
American Brattice Cloth Corp.	96
American Car & Foundry Co.	16
Anaconda Wire & Cable Co.	30
Atlas Powder Co.	26
Bethlehem Steel Co.	100
Bituminous Coal Institute	91
Bowdil Co.	22
Cardox Corp.	20–21
Chicago Pneumatic Tool Co.	31
Crucible Steel Co. of America	64
Deister Concentrator Co., The	106
Du Pont de Nemours & Co., Inc., E. I.	24
Edison, Inc., Thomas A. Storage Battery Div.	98
Electric Storage Battery Co., The	29
Elreco Corp., The	88
Euclid Road Machinery Co., The	17
Flexible Steel Lacing Co.	99
General Electric Co.	2–3, 10–11
Gardner-Denver Co.	4
Goodman Mfg. Co.	15
Harnischfeger Corp.	13
Hewitt-Robins, Inc.	92–93
Hoffman Bros. Drilling Co.	112
Independent Pneumatic Tool Co.	97, 103
Ingersoll-Rand Co.	23
International Harvester Co.	14
Jeffrey Mfg. Co.	8–9
Jones & Laughlin Steel Corp.	109
Joy Mfg. Co.	18–19
Kennametal, Inc.	Third Cover
Link-Belt Co.	Second Cover & 108
Longyear Co., E. J.	25
Macwhyte Company	102
Mine & Smelter Supply Co.	87
Mine Safety Appliances Co.	Back Cover
Mott Core Drilling Co.	112
Myers-Whaley Co.	1
Paris Mfg. Co.	104
Pennsylvania Drilling Co.	112
Reliance Electric & Engineering Co.	6
Roberts & Schaefer Co.	32
Rock Bit Sales & Service Co.	105
Roebling's Sons Co., John A.	12
Salem Tool Co., The	28
Sprague & Henwood, Inc.	99
Standard Oil Co. (Indiana)	7
Timken Roller Bearing Co.	27
United States Rubber Co.	79
Universal Vibrating Screen Co.	112
Victaulic Co. of America	107
Western Machinery Co.	84
Woomer & Associates, J. W.	95
Young, L. E.	95

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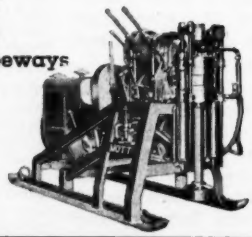

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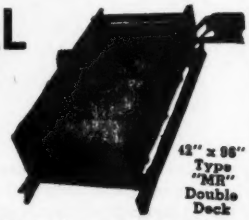

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New Bit Rotary Drills Bolt Holes in Medium Hard Roof . . .

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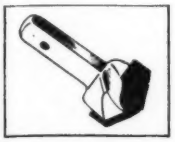
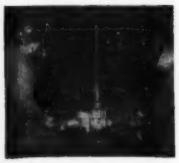


Development of a rotary bit for rock and laminated sandstone has been announced. The bit (FD Series) is used in coal drills.

Commenting on the bit, Curtis F. Rivers, Gen. Supt., Tennessee Product and Chemical Corp., Whitwell, Tennessee, predicted that it would save coal operators thousands of dollars. A Kennametal cemented carbide cutting edge resists shock and impact, and its shape makes it ideal for starting.



The operation shows the bit being powered by a Jeffrey A-7 Drill. A special alloy steel drill rod is used.

Write for Bulletin M-105. **Kennametal Inc., Latrobe, Pa.**

•

30% Less Power Required To Cut Coal, Reports Claude Matthews, Supt., Moore Coal Co.

Tests made by a West Virginia engineering concern show that Kennametal U-5-H Machine Bits consume 30 per cent less power than conventional steel bits. The power comparison was made at the Moore Coal Company.

Mr. Claude Matthews, Supt., said that an Esterline Angus watt-hour meter showed that steel bits placed 105% of rated load on the motor and that Kennametal bits required only 75% of rated load. The horsepower consumption was 52 against 37.

Write for Bulletin M-115. **Kennametal Inc., Latrobe, Pa.**

•

Bit Developed for Shale, Slate, and Boney Roof Drilling

A special bit for rotary drilling roof bolt holes in shale, slate, and boney has been developed. The bit, (RD Series) is a modification of the conventional coal bit. It is stubbier and stronger.

Write for Bulletin M-105. **Kennametal Inc., Latrobe, Pa.**

Drill Sandstone

Better, at Less Cost—with Kennametal Rock Bits

Operators get up to 75% faster drilling, over 100 times longer bit life. *Examples are:*

LOCATION		FOOTAGE		Ratio of Bit Life	% Increase in Speed
County	State	Steel	Kenna-metal		
Cambria	Pa.	1.1'	198'	180 to 1	75%
Monongalia	W. Va.	8.0'	1336'	167 to 1	33%
Westmoreland	Pa.	1.2'	254'	212 to 1	42%
Raleigh	W. Va.	6.8'	1305'	192 to 1	46%
Average life and speed increases on these four typical operations:			→	188 to 1	49%

You get better bolt holes with Kennametal cemented carbide rock bits, because hole gage is uniform—the whole length. Bolts have better anchorage and make safer, more secure jobs. Drilling speeds are increased because Kennametal cemented hard carbide rock bits have high resistance to wear, stay sharp and on the job far longer.

Performance clearly shows that first cost is of slight consideration and that bit cost is from 50 per cent to 20 per cent less under average drilling conditions. In addition to lower bit cost consider other advantages such as speed, handling time and bit changing.

Your Kennametal representative is an experienced mining man—ready to demonstrate to you how Kennametal rock bits can give you savings that are really outstanding. Contact him or write—Mining Division, Kennametal Inc., Latrobe, Pa.

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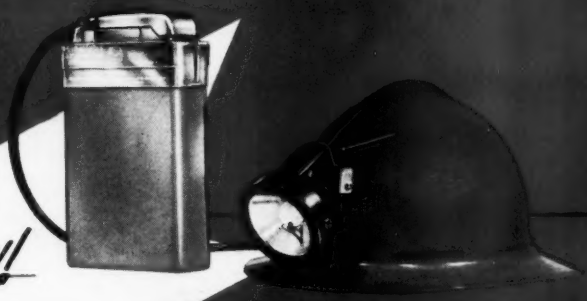

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